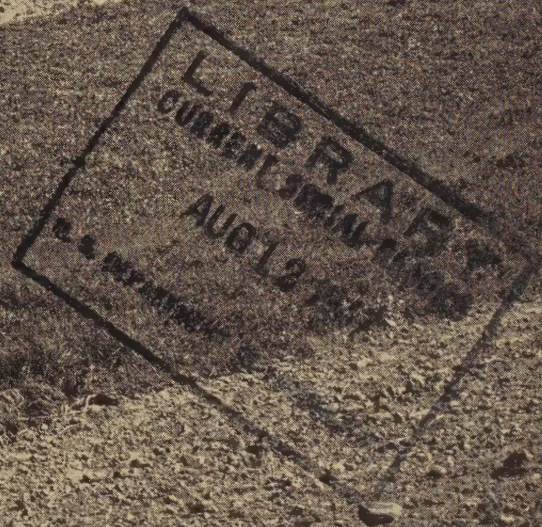


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SOIL CONSERVATION

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WELLINGTON BRINK

Editor

Art Work by

W. HOWARD MARTIN

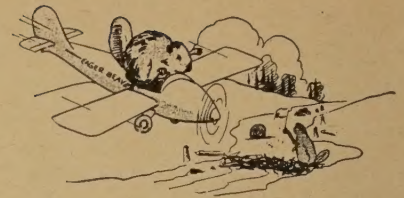
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AIRGOING BEAVERS.—In the mountainous parts of the West, the best summer forage was once produced in mountain meadows. In many places, misuse of such meadows caused gullies to form down the middle of productive areas. The gullies lowered the water table, changed the damp area to a dry one, and invited the invasion of sagebrush and other worthless shrubs.

The way to renew production is to dam up each such gully and raise the water table. Mountain meadows, however, are usually small and inaccessible, making the cost of man-made dams more than is justified by the returns. A solution that applies, where a gully contains a permanent flow of water and plenty of willows or aspen, is to forget about human engineering and the cost of cement and labor and go back to Nature by introducing beavers. Beavers use local materials and work for far less than the prevailing wage scale. They are not much on design, but are experts on maintenance.

In parts of central California beavers have made themselves unpopular by damming up irrigation and drainage ditches and digging holes through dikes. In some of the soil conservation districts in San Diego County there are gullied meadows, but no beavers. Therefore, the California Division of Fish and Game, co-operating with soil conservation districts and the Soil Conservation Service, decided to bring the beavers and the gullies together. Into the Julian Soil Conservation District, eight beavers were

(Continued on p. 6)

THE COVER.—Herman Postlethwaite went to his home state of West Virginia to photograph this inviting scene of a happy homestead. The Farm of Frank Jack Orom, located in the Northern Panhandle Soil Conservation District, is neither spectacular nor unusual these days. It runs to a conservation pattern. In the foreground we see freshly plowed contour strips; a little farther back a hint of



orchards and berries also on contour. That looks like one of the new and very popular fish ponds, just beyond the barn. Soil conservation, as typified here, adds both security and satisfaction to country living.

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a Plan on

EVERY FARM

Behind Ronald B. Elmes, district conservationist, and Omar Spencer, chairman, stand A. N. Scritsmeir, secretary; Louis Minoggio, farmer; Kirby E. Brumfield, work unit conservationist; Paul Reeder, drainage district supervisor; John B. Galloway, supervisor; Boy Scout members of Sauvie 4-H Club; Earl C. Nichols, supervisor, and Frank G. Patterson, supervisor. Another supervisor, Carl Keller, was absent.

By HERBERT R. N. BODDY

TO THE SAUVIE Island Soil Conservative District goes the distinction of being the first district in the country with 100 percent farm planning. By the fall of 1946 the board of supervisors was able to announce that all 96 district farmers, operating 16,726 acres, had a farm conservation plan working for them. That is a record that will stand until challenged.

"Our best soil conservation advertising is a complete land-use plan in operation," says Omar Spencer, chairman.

The little farming community of Sauvie Island, located 8 miles down the Columbia River from Portland, Oreg., is only a dot on the map. For more than a century dairying has been the island's chief enterprise.

Today Sauvie farmers are turning thousands of acres of drained lake-bottom land to the production of record cash crops.

NOTE.—The author is in the current information section, Pacific Coast Region, Soil Conservation Service, Portland, Oreg.

Says Spencer, "When farmers reported good results from complete land use plans their neighbors requested similar plans. By citing nearby examples of successful farm practices we spread the gospel of soil conservation to every farm in the district. We won the doubting Thomases over by showing them, by actual practice, that conservation farming is best."

What to do about their problem of excess water was the question before the Sauvie supervisors when they gathered for a roundtable meeting 2 years ago. Technicians of the Soil Conservation Service explained that drainage of the island's wet lands was prerequisite to getting other appropriate practices applied to the land.

How the district supervisors and farmers worked out the water problem is a prime example of district teamwork.

Until 1940, when 16 miles of dikes were built along the banks of the Columbia River and Multnomah Channel by the United States Engineers, three-fourths of the island's surface had been washed by seasonal silt-laden floods.

High waters reached their peak during spring freshets when the rising Columbia and Willamette rivers flooded much of the island's pasture land.

There were times when water on the ponded pastures was too high for grazing. On these occasions Sauvie dairymen moved their herds off the island to forage on the mainland.



Around 312,700 cubic yards of ditch banks were leveled under the district program. The ditches spill into the 8-mile-long Gilbert River, main outlet. Kirby E. Brumfield, work unit conservationist, stands here on banks.

Four years later, when the Sauvie Island landowners organized the soil conservation district, the surplus water problem was only partially solved. The levees protected the land from floods and the ditching job done by the Sauvie Island Drainage District helped drain it. Still, around two-thirds of the district continued to be either under water or waterlogged.

Working side by side with the supervisors, Service technicians outlined an over-all drainage program.

The farm drainage plans fitted into the over-all district work program. They also matched the pattern of the drainage districts.

On Sauvie Island, the drainage districts' main job is to keep the two main waterways clear—the 5-mile A-1 canal, the 8-mile Gilbert River, and other small main drains. The drainage districts, also undertake to drain farm lakes when the water has a depth of 5 feet or more.

All other farm drainage work in the district is



Dill, cabbages, and sweet corn supersede tules and swales on Tony Pastorino's 311-acre farm. Two hundred crates of cabbages is pretty good for first year the land was used (1946), think Pastorino and District Conservationist Elmes.



Ponds and swales waterlogged two-thirds of Sauvie Island before the coming of the soil conservation district.

handled by the farmers as part of their farm conservation plans.

Farmers are assessed by the drainage district for their portion of the over-all district drainage cost. They are on a pay-as-you-go basis.

Work of the Sauvie Island Soil Conservation District and drainage districts is closely coordinated. All phases of the island's drainage problem are worked out cooperatively with supervisors of the soil conservation district and the drainage districts.

Service engineers laid out individual drainage plans as an integral part of each farm-conservation plan. They showed farmers how to construct ditches and how to use them to dry up lakes and wet lands.

Using equipment rented from the district office, Sauvie farmers completed 77 miles of ditches and drained around 10,000 acres of lowland by June 1946.

Drainage is not the only use that farmers make of their ditches. Service technicians showed them how they could use them for irrigation.

It was demonstrated, for instance, that a 10,000-acre area could be drained by tapping the four fresh-water inlets built into the levees. The main island waterways carry the water to the farm ditching systems.

Farm land went up in value from \$75 to \$200 per acre after the drainage program got under way. But the change in agriculture is even more significant.

"Last summer's crop and dairy output was the island's best," explains Ronald B. Elmes, district conservationist. "Top yields were the general

rule and many truck crops were raised on Sauvie Island for the first time in 1946."

Elmes said 3 to 4 tons of cabbages were the average output before the district was formed. Last summer more than 10,000 tons went to market. The sweet corn crop was stepped up seven times and production of potatoes was doubled.

Peppers, cauliflower, green onions, peas, and cucumbers were raised for the first time. The crop of cucumbers was 1,400 tons. Green peas average $1\frac{3}{4}$ tons per acre.

Dairying also improved. Drainage of old pasture land and the addition of new fields put the dairy farms on a sound basis. Herds are now sustained on less acreage due to use of better pasture management and seeding of improved grasses and legumes.

"The upswing in agricultural products on Sauvie Island has yet to reach its peak," Elmes said. "Our technicians have told the farmers that they may expect further increases in crop production next year and for some time to come. The farmers understand that production will increase as they continue to apply the practices set forth in their farm conservation plans."

Along with the drainage assistance given the district supervisors, Service technicians have helped farmers apply needed soil-improvement practices.

High on the list of practices carried out by Sauvie farmers under their complete land-use plans is their record in spoilbank spreading. Farmers have leveled a total of 312,700 cubic yards of

ditch banks. Fifteen miles of ditches have been seeded.

District teamwork is spotlighted in the following 2-year work summary:

Crop residue management, 6,780 acres; irrigation systems installed, 3,377 acres; noxious weed control, 6,330 acres; approved crop rotation, 3,140 acres; seeding of grasses and legumes, 937 acres. Fertilization, land leveling, and cover cropping round out the list of practices.

For the most part the practices applied by Sauvie farmers have been established on drained lake beds or waterlogged land.

Drainage continues to be the district's No. 1 job. Sauvie farmers apply agronomic practices as fast as they can work their drained lands. They expect these land-building and soil-improvement practices to be in full force less than 2 years hence.

"Our supervisors," noted Spencer, "follow the policy of giving assistance to district members when it is needed. We go out on the ground with Service technicians, and talk things over with the farmer. We make a point to understand his soil-conservation problems."

The Sauvie board of supervisors have built up a substantial working capital from rental of equipment and farm implements.

Around \$6,500 has already been spent on purchase of equipment and farm implements. An additional \$10,000 from district funds has been set aside to buy more equipment.

Spencer recently reviewed progress in the Sauvie district in this light: "Our district-wide drainage program, backed up with tested farm conservation practices, has developed a high level of productivity on the island. Farm and community life has been stabilized and landowners are happy over their district's prosperous outlook."

BEAVERS (Continued from page 2)

brought by truck. They have done well, but arrived looking so battered and unhappy after their 500-mile ride that it was felt something better was needed. Therefore, when gullies on the Moreno Campo-Potrero Soil Conservation District called for beavers in 1946, the State flew the beavers in! Four Merced County beavers were taken from live traps in the morning, and released in San Diego County that afternoon. Three of the beavers were fat and sassy, and the fourth was fat but had temporarily lost his sass through a touch of air sickness. However, as a result of this trial, the State hopes in the future to make all long-distance deliveries of beavers by air.—RICHARD M. BOND.



CHAMP DOG, CHAMP CROP.—Bicolor lespe-deza helped Satilla Sam win the National Amateur Field Quail Championship at Union Springs, Ala., early this year. Lester Varn's white and black pointer took the title from the large field of 53 starters. Varn is chairman of the Florida Game and Fresh Water Fish Commission.

One of Satilla Sam's four covey finds was in a small draw at the edge of a bird strip planted in 1946, made of five rows of the new champion quail food—bicolor lespe-deza. George Harden, manager of the Maytag plantation where the field trials were held, assures us that no covey had used that draw for many years. Bicolor turned the trick, as it has in dozens of other places.

In another planting made in 1941 on the same plantation, a covey (never present before), has wintered on the bicolor every year—until 1946-47. This year the bicolor plot held two coveys.—VERNE E. DAVISON.



THEY COME FROM INDIA.—Six officials from the Indian Government began a year's training with the Soil Conservation Service in May. From left to right: Dr. D. C. Kaith; Dr. A. G. Riaz; Dr. A. T. Sen; J. C. Dykes, Assistant Chief, SCS.; Dr. Grewal, Assistant Education Officer, Government of India, Washington; Dr. D. J. Gandy; William X. Hull, foreign liaison representative, SCS.; Dr. S. P. Raychaudhuri; Dr. R. J. Kalamkar.

MORE LEGAL LIGHT.—Robert V. Wollard, assistant attorney general of New Mexico, at request of the State Soil Conservation Committee, has written an explanation of district law which is being sent to all supervisors, district offices and county agents. The author states that he follows "in many respects" an article by Governor Mickelson of South Dakota, in SOIL CONSERVATION Magazine for March 1947.

Flying Farmers

WING ACROSS DISTRICT



Ready to take to the air: David Friday, a director of Michigan Flying Farmers; Milan Grinnell, editor of the Michigan Farmers Magazine; Lee Talladay, president of the Flying Farmers.

By WASHINGTON R. O'BRIEN

MICHIGAN'S flying Governor, Kim Sigler, met with 50 members of the Michigan Flying Farmers at Hartford, Mich., last May for the first soil conservation air tour ever held in the State. The visitors saw erosion and soil conservation in the Van Buren and St. Joe River Soil Conservation Districts.

The tour was arranged by E. C. Sackrider, State conservationist, and G. A. Thorpe, assistant State conservationist, in cooperation with Milan Grinnell, the editor of the Michigan Farmer, and Lee Talladay, president of the Michigan Flying Farmers.

Planes began to appear over the Hartford airport about 10 a. m., coming from north, south, east, and west. By noon practically all planes had arrived, some coming 200 miles. The press and radio were well represented by local papers, and arriving by air were staff members of the Michigan Farmer, the Detroit Free Press, the radio stations WJR, Detroit; WPAG, Ann Arbor; and WKZO, Kalamazoo.

A short business meeting was followed by a pot luck dinner, with local people furnishing coffee and sandwiches.

Governor Sigler then took over on the lee side of the airport hangar away from a biting northwest wind. Here he told the group of his interest in aviation, flying, and soil conservation.



Peaches, apples, and pears contour planted and terraced, on farm of Lewis Umphrey, of Coloma. Contour strip cropping in background.

of interest in relationship to natural landmarks. A key on the sheet told what was to be seen at each spot.

Then came a 20-minute briefing and description of what would be seen on the tour by the district conservationist of the Soil Conservation Service. He was assisted by David Friday, flying farmer and farm equipment manufacturer of Hartford, who served as host.

Each flyer was given a map prepared by Jerry Mandigo, Van Buren County agricultural agent. These maps outlined the route and noted the points

NOTE.—The author is district conservationist, Soil Conservation Service, Benton Harbor, Mich.

Farm of Roy Butzbach, Bainbridge Center, shows frost pocket as dark area. Unsuitable for fruit, this area was reforested by the Soil Conservation Service with 13,500 red and scotch pine in 1937. The area surrounding the pines is set to a 2,300-tree terraced peach orchard, 500 of which are on closed-end terraces on sand. There has been no run-off since they were built. The heaviest storm they have had to withstand brought 3.4 inches of rain, 1.7 inches coming in 20 minutes.



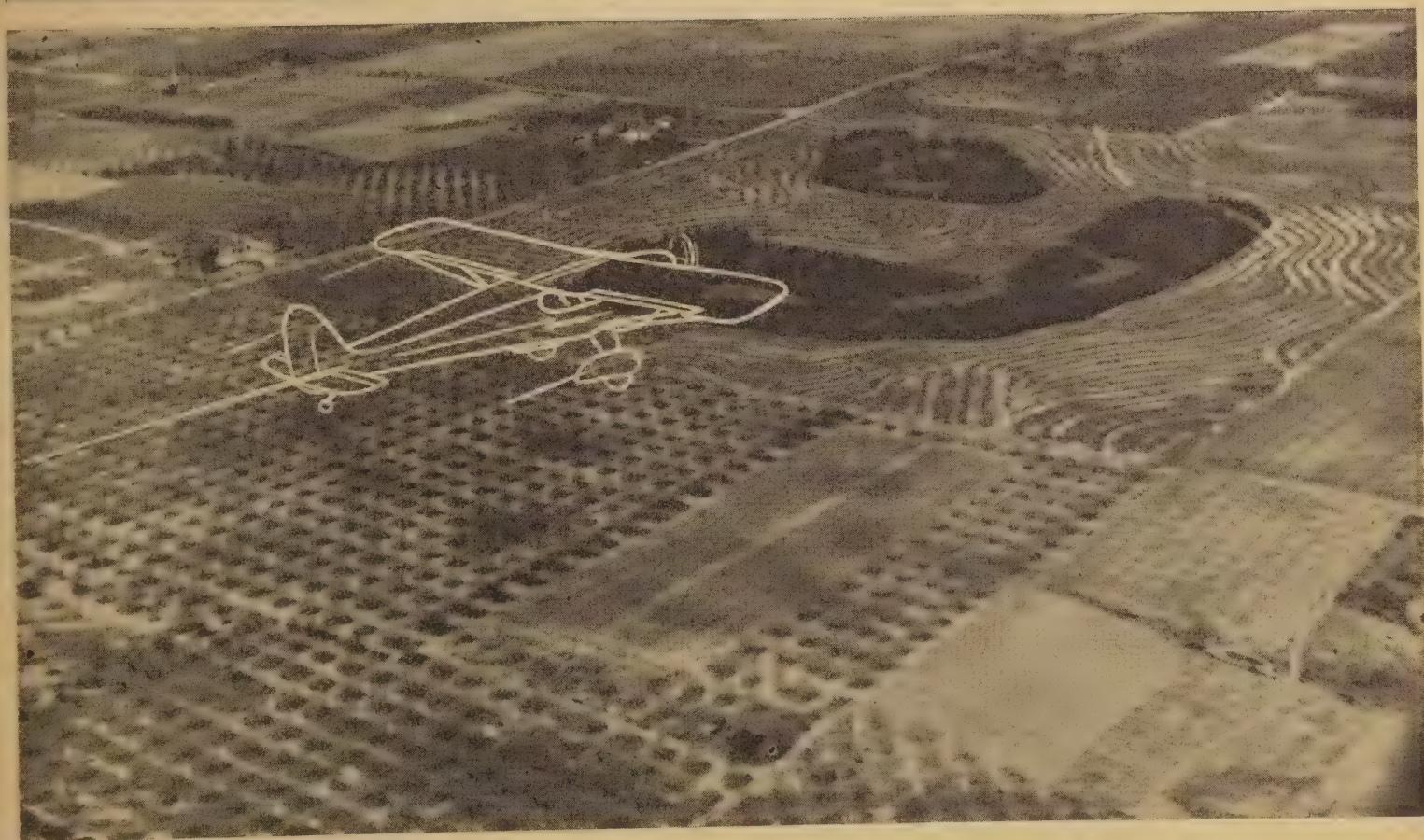
←
Michigan Flying Farmers
gather about their ships at
Hartford Airport, to compare
notes on flying and farming,
just prior to take-off on tour.

The group of nearly 40 planes took off in single file, with Friday leading in his little red Cub. The planes were flown at an altitude of 1,000 feet, with all altimeters being zeroed in at the Hartford airport before the take-off.

The planes flew directly to the first stop, spaced about one-quarter of a mile apart. Here, as at

each of the succeeding 13 points of interest, they circled to the left, letting down to 500 feet, and passing under the other planes as the circle was completed. Completing the circle, the lower planes climbed back to 1,000 feet and flew to the next stop where the procedure was repeated. The tour made a circuit of about 50 miles and lasted for about an hour.

Michigan's flying Governor,
Hon. Kim Sigler, arrives to
talk over farm problems with
the flying farmers. ↓



At the first point of interest the flyers saw the Efting Drain, the first drain with which the Soil Conservation Service assisted, in the Van Buren Soil Conservation District. Next, came the Byrd and Spellman blueberry plantation, where more than 100 acres of blueberries are planted in one block on poor land unadapted to other crops.

The Covert School, owner of a 40-acre block of land on which the school has started a reforestation project, was the third point of observation. Then came land destroyed by wind erosion and soil depletion, where grew the prize peaches shown at the International Exposition at Paris, France, in 1900.

The flying farmers then viewed the Van Buren County forest along Lake Michigan, where more than 50,000 pine trees have been set on a 200-acre tract. Skirting the shore of Lake Michigan north of Benton Harbor, the flying farmers saw Marvin's Slide, a large active sand dune thrown up by wind erosion. This active dune moves eastward at about 17 feet per year.

Spots 7, 8, and 9 were contour orchards coming in close succession near Caloma. John Miller planted a peach orchard on the contour in 1945, and Victor Friday also has a large block of peaches on the contour. On the Lewis Umphrey farm peaches, apples, and pears have been successfully grown on the contour. The grower formerly used square planting but lost too much soil because of erosion. Here also were sod waterways and contour strip cropping of general crops.

Cutting across country for the tenth point of interest, the flyers came to the farm of Roy Butzbach, Bainbridge Center, where 13,500 red and scotch pine were set in 1937 in a location too frosty for fruit. Around this planting were set 2,300 peach trees on terraces. Five hundred of the trees were set on closed-end terraces, on sand with no outlet. These terraces have had no run-off since 1937, holding a peak storm of 3.4 inches of rain, 1.7 inches of which came in 20 minutes.

Traveling on to Keeler, Mich., for the eleventh station, the flying farmers saw land completely destroyed by gullies. This land can no longer be farmed, yet when the Armistice was signed in 1918 the owner was getting 300 bushels of potatoes per acre.

The farm of David Friday next slid under the planes. Here vegetation is used for erosion control. A large block of contour peaches planted on plow-built terraces was seen from the air on

the Geisler Brothers' farm near Hartford. The last point of interest was the Hartford Millpond on the Paw Paw River. High water, with 8.51 inches of rain in April, took out the dams at Hartford and Lawrence on the Paw Paw River. The heavy siltation in the old millpond could be seen very well from the air.

The planes took off for home without landing.

A Report to the Citizens



COVERING ITS ORGANIZATION AND PROGRAM

By
THE DISTRICT BOARD OF SUPERVISORS
Rocky Mount, Virginia
December, 1946

SPREADING THE WORD.—Can't get ahead of Blue Ridge! Noting the account of doings in the Lord Fairfax Soil Conservation District in the May issue of this magazine, the board of supervisors of Virginia's Blue Ridge Soil Conservation District has underwritten subscriptions to SOIL CONSERVATION Magazine on behalf of its own five members, the five county agents and the five SCS work unit offices within the area. Already on its toes, the district has resolved to keep that way!

The Blue Ridge district has recently issued an attractive, informative report of the sort it plans to get out at 5-year intervals, "to bring the general public up-to-date on the accomplishments of the district program." Three thousand copies are being distributed to farmers, civic leaders, and others, and plans are being made for a reprint of 5,000 copies which will be financed by bankers.

NOTE TO READERS.—I would appreciate postcards or letters telling me what ideas, practical help or specific values you have obtained from articles, illustrations, or news items appearing in this magazine. What kind of material do you find most useful and interesting?—
WELLINGTON BRINK, EDITOR.



Drag line bites at main canal, while water eagerly seeks a way to freedom.

Milbank rescues Drowning Acres

By C. M. ELLERBE

JEREMIAH MILBANK, New York financier and owner of 21,000 acres of land in Jasper County, S. C., is pointing the way on his South Carolina plantation to the profitable use of some 3,000,000 acres of good "low country" soil in the State which has not been developed because of inadequate drainage.

When Milbank bought Cypress Woods Farms in 1939, it consisted of about 20,000 acres of pines and swamp, part of which was covered with water during much of the year. A heavy growth of hardwoods occupied an area of poorly drained land that at one time had produced rice. The previously cultivated upland fields were sandy and relatively infertile. As late as 1943, only 605 acres were available for production of feed crops and pasture.

After he had owned the land a few years, Milbank became interested in developing it into a farm that would pay its own way and in the spring of 1943 he made application to the Jasper County Soil Conservation District for a complete land use plan. The request for assistance was approved by the district supervisors and a soils tech-

nician of the Soil Conservation Service made a detailed conservation survey of the farm as the first step in developing the land use plan.

In making the survey, the soils technician walked over the entire farm, made soil borings at frequent intervals, and studied the physical characteristics of the soil. He then sketched the boundaries of the various soil types on an aerial photograph. He noted on the photograph the soil types, steepness of slope, degree and extent of erosion, and existing land use on every separately delineated area. This provided a conservation survey map of the entire plantation.

This inventory of the land capabilities served as a basis for preparing a well-balanced land use program. It revealed that the land being used for cultivation was sandy, droughty, and very low in fertility and could produce only submarginal yields of field crops and pasture grasses. The survey showed approximately 1,820 acres of these Blanton sands on the farm. Associated with this area of excessively drained sands were 3,600 acres of poorly drained Leon and St. Johns sands, having organic hardpans lying below plow depth which would interfere seriously with production of crops, and 600 acres of poorly drained Onslow

NOTE.—The author is soil scientist, Soil Conservation Service, Walterboro, S. C.

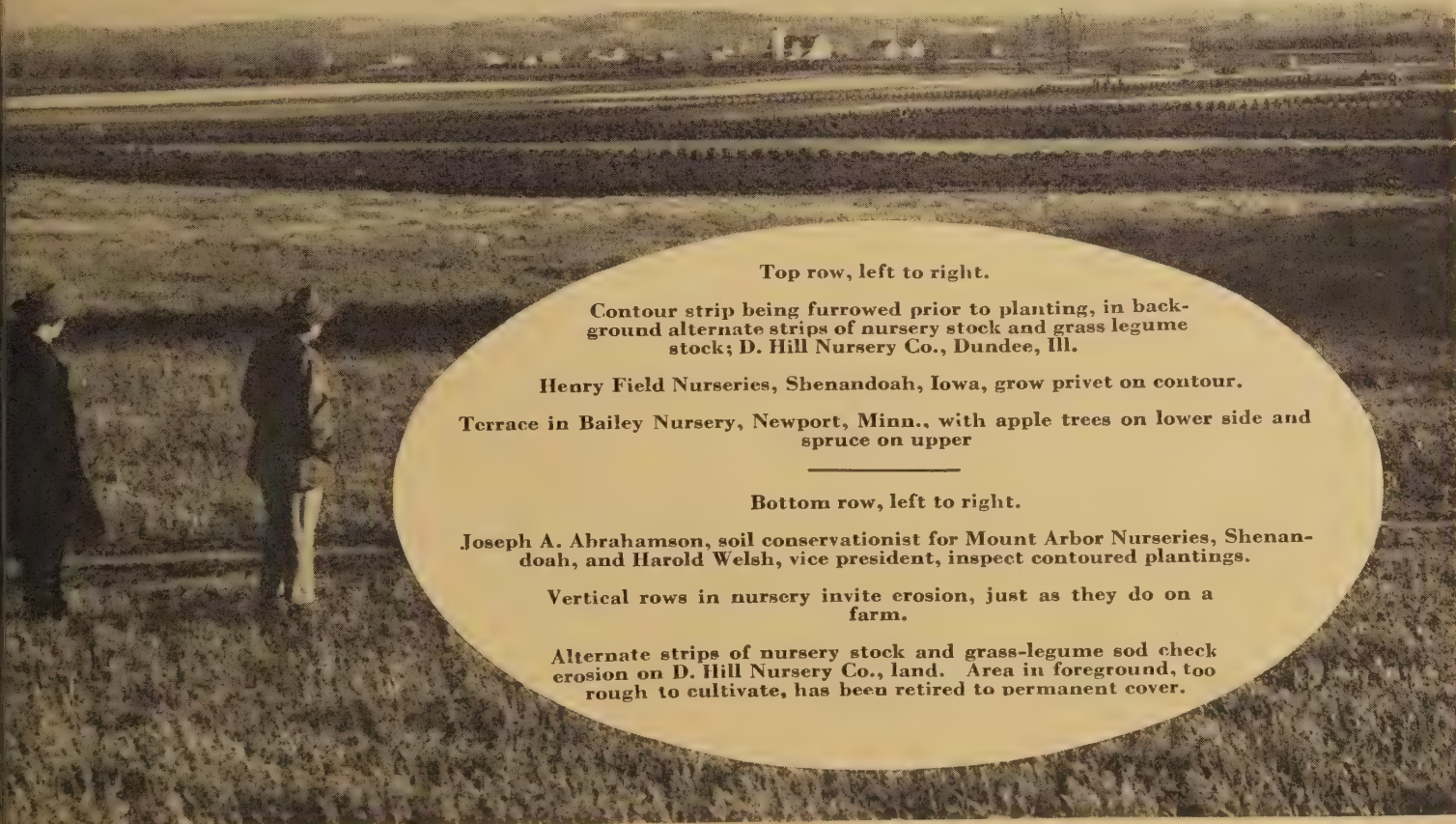
(Continued on page 16)

Off to the Right Start





BY ARTHUR D. SLAVIN



Top row, left to right.

Contour strip being furrowed prior to planting, in background alternate strips of nursery stock and grass legume stock; D. Hill Nursery Co., Dundee, Ill.

Henry Field Nurseries, Shenandoah, Iowa, grow privet on contour.

Terrace in Bailey Nursery, Newport, Minn., with apple trees on lower side and spruce on upper

Bottom row, left to right.

Joseph A. Abrahamson, soil conservationist for Mount Arbor Nurseries, Shenandoah, and Harold Welsh, vice president, inspect contoured plantings.

Vertical rows in nursery invite erosion, just as they do on a farm.

Alternate strips of nursery stock and grass-legume sod check erosion on D. Hill Nursery Co., land. Area in foreground, too rough to cultivate, has been retired to permanent cover.

IT IS TRULY SAID that soil conservation is changing the American landscape. If you want to see new evidence of this continuing change visit some of the commercial nurseries in the midwest. During the past few years, nurserymen throughout the Corn Belt have undertaken soil-conservation work and many of them are among its most ardent supporters.

Corn, hogs, and livestock have pretty much set the agricultural pattern for the Corn Belt. Commercial nurseries are by comparison a highly specialized type of agriculture. They are even more than that, because the men who operate commercial nurseries are about as representative of the small business man as anyone you will find.

Recognized as an agriculturist, the nurseryman in his operations must be more than that. His physical set-up, labor, and special equipment needs place him in a position comparable to the small manufacturer. Because he cannot sell his product like the ordinary farmer through a common outlet, such as the grain elevator, stockyard, or commission house, he also must be a merchandiser. The nurseryman, a real go-getter, must combine the attributes of both the farmer and the business man.

If you want to know how he operates, ask the farm planners in about nine soil conservation districts scattered through Iowa, Illinois, Minnesota, Ohio, and Missouri. Invariably they will tell you that when it comes to getting conservation on the land he is about the fastest acting, hardest pushing type of individual that has so far joined in helping to guarantee America a permanent agriculture. Commercial nurseries in the Midwest are practicing soil conservation because they want to, not because they have been the target of any particular attention. In fact, until a few years ago soil conservationists had not given much thought to this type of agricultural enterprise.

IN 1941, the Page County Soil Conservation District in southwestern Iowa was beginning to get a lot of conservation on the land. At the same time the Mount Arbor Nurseries, located in the district, began to notice serious erosion losses on its 1,200 acres of nursery land. Harold S. Welch, executive vice president of the company, made two observations as he traveled about the district:

NOTE.—The author is chief, regional nursery division, Soil Conservation Service, Milwaukee, Wis.

(1) Mount Arbor was suffering soil losses which were being reflected in poorer nursery crops.

(2) Other farms in the area were treating their land and were preventing soil loss.

The result was that Welch applied to the district for assistance.

Starting on a small scale, the first work consisted of terracing and contouring several fields that were then being planted to nursery stock. After two seasons it was obvious that more than terracing and contouring would be necessary to do the job. In 1943 technicians of the Regional Nursery Division were called in to assist in the development of a complete plan. The author well remembers Welch's remark at that time, "You don't have to sell us soil conservation. We know we must have it to stay in business. Just tell us what we need and we will do the job."

DESPITE the many problems which confronted the company during the war years, the job was done just as Welch had forecast. The company not only installed conservation practices on its original 1,200 acres, but also has a program well under way on 600 additional acres acquired since the first plan was developed in 1943. This later development has been accomplished largely through the efforts of Joseph A. Abrahamson, formerly of the Soil Conservation Service, and now employed by Mount Arbor Nurseries as soil conservationist in charge of conservation activities. Today Joe is an important man on the Mount Arbor staff, and if you want to see him you had better make arrangements in advance. Even then Joe may have to cut short the visit—because he must catch a plane or train to Missouri, Texas, or one of the other States where the Mount Arbor Nurseries has production centers.

During the several years the Mount Arbor people have had their plan in operation, the nursery has become a mecca for nurserymen from other parts of the country. Today it is commonplace for nurserymen to ask, "Can you give us something like that at Mount Arbor?"

THE PLAN at Mount Arbor resembles a typical farm plan more closely than one might imagine if he is not intimately acquainted with nursery operations. Because the land at Mount Arbor is rich, fertile, windblown loess, terracing and contouring are a "must" on all slopes of more

than 6 percent. Grassed waterways are also common. Probably most important of all is the fact that all nursery crops are grown in rotation with brome-alfalfa sod. The type of rotation varies according to land use capability and type of nursery stock grown.

Out in western Iowa, with its steep slopes and loessal soils, the value of such practices as contouring, terracing, and grassed waterways is obvious to anyone who has been in that area after a rain. Because I wondered how tangible a nurseryman might consider the effects of a good rotation, last fall I put this question to Welsh: "You mention the value of terracing and contouring but what do you consider you are getting out of your nursery stock-grass sod rotation?"

The reply was clear cut, Welsh said, "Slavin, you remember that 22-acre field we seeded to brome-alfalfa in 1941. That field has produced apple stock for years. We didn't know it, but when we seeded that field down I didn't think of it in terms of future nursery stock. We were just going along with you and never expected to do much more than get a protective cover on that field. After 3 years in sod it looked so good that we broke the field and put it into apple stock. According to our figures that old, worn-out, eroded field produced the greatest percentage of No. 1 apple stock per acre that we've produced anywhere in the nursery during the last 18 years."

A YEAR AGO the development of a soil-conservation plan was started on the D. Hill Nursery Co., at Dundee, Ill. Recognized as the largest wholesale grower of ornamental conifers in the country, the Hill nursery operates 700 acres of land. Ornamental conifers are propagated almost entirely from cutting or by grafting done in the greenhouse. After the young trees go to the field, they are transplanted 2 or 3 times before being sold. As the Hill nursery keeps the stock in the field 3 to 4 years after the last transplanting, it will require about 7 years to get the plan into full operation. During the first year, however, application of conservation practices was completed on 270 acres. Because only conifers of about the same age class are produced, it has been impossible to follow a more or less uniform pattern of both rotations and practices on the entire nursery.

In brief, the plan on the Hill nursery includes a series of diversion terraces entering into an open drainage channel. The channel cuts through the

nursery, following natural waterways which were formerly subject to much erosion. This open drainage is necessary because, in addition to handling run-off from the nursery itself, it must take care of a 360-acre watershed that lies outside the nursery. Between the diversions, which have an average spacing of 450 feet, contour strips approximately 100 feet in width are laid out. These strips are alternated in sod and nursery stock. Two rotations are used, depending upon the slope and existing erosion—N-N-N-N-S-S-S-S- and N-N-N-N-S-S-S. Areas where the topography is too irregular or the slope too steep for the production of nursery stock have been retired to permanent grass or wildlife cover.

Because much of the beneficial effect of the sod in the rotation will diminish or be lost after the second year, the plan calls for top dressing all nursery fields with manure beginning the third year. At other nurseries, where stock sometimes remains in the field for 8 to 12 years, it is believed this practice will supply the organic matter necessary to maintain the soil in good tilth. Obviously in such long rotations it is essential that nursery stock be kept off of steep slopes, and even on gentle slopes of 5 to 10 percent adequate supporting practices must be followed at all times.

SEVERAL other procedures to reduce the hazards of long nursery rotations are being tried in various parts of the region. Among these are buckwheat or oats as winter cover crops, a smothering mulch of hay cut from the fields which are in the sod part of the rotation, and permanent seeding of shallow rooted grasses and legumes, including such species as bluegrass, fescue, white and Ladino clover. This does not mean that all nursery blocks are on the contour. At almost every nursery certain types of stock must be grown in straight rows to facilitate such operations as digging. The solution is to arrange the production plan so that the class I or more level land is assigned to this type of stock. It is interesting, however, to note that when a nurseryman starts on a soil conservation program he often estimates that as much as 50 percent of his stock must be grown in straight rows, but after a year or so of experience he will of his own accord put as much as 75 percent of his production on the contour.

BASED on the excellent results obtained by the Mount Arbor Nurseries, the Andrews Co. of Faribault, Minn., one of the leading small fruit

growers in the country, and the J. V. Bailey Co. of St. Paul, Minn., a large retail nursery, have made excellent starts toward developing conservation programs. Last fall the Jewell Nursery Company of Lake City, Minn., one of the largest wholesale nurseries in the Midwest, working with the Lake Pepin Soil Conservation District, developed a complete plan for the 750 acres which it operates. Ten days after the plan was completed, the construction of several terraces was started as the first step in applying the plan.

NOT TO BE OUTDONE by fellow nurserymen in Iowa, Illinois, and Minnesota, nurserymen in Ohio are now developing plans through their respective districts. Since January 14 nurseries in Ohio have requested assistance, with most of the work concentrated in Miami and Lake Counties, both of which are well-known nursery centers. Lake County, of which Painesville is the county seat, is the oldest and one of the largest nursery centers in the Midwest. According to the 1940 census, 54 percent of the agricultural income of Lake County was derived from nurseries and related business. Because they produce large quantities of materials known in the trade as finished stock and specimen material, much of the stock, such as conifers and shade trees, remains in the nursery block 6 to 12 years. This necessitates special attention to such treatments as winter and sod cover crops, manure top dressing, and mulches during the later years of the rotation.

Planning commercial nurseries in region 3 follows about the same procedures used in regular farm conservation planning. After the district receives a request for a conservation plan from the nursery, the regional nurseryman is advised, and a date is set to meet with the work unit conservationist and nurseryman. By the time this meeting is held the land use capability map has been prepared. The first step in the planning procedure is to meet with the nurseryman, or the group of nurserymen if applications have been made as a group. At this meeting the regional nurseryman, acting in the capacity of a planning specialist, explains what is meant by a complete conservation plan, and what procedures are necessary. Particular emphasis is placed on soil management. Supporting practices, including drainage where it is a problem, are also discussed. The nursery operator then outlines his set-up, including categories of stock produced, annual acreage needed, length of

time each crop remains in the nursery, and any special production problems he feels he has.

Armed with this information, the regional nurseryman and the farm planner then rough out a plan that will do the job. This may require 1 or 2 days, after which another meeting is held with the nurseryman. At this meeting the generalized plan is discussed pro and con, and adjustments made to meet the particular technical problems and operating conditions of the nurseryman. The final plan is then prepared.

Because nursery work is highly specialized, fields or blocks, as they are generally known to the nurserymen, are often quite small. Sometimes they include less than 2 acres of land. For that reason, changing a nursery lay-out to permit such practices as contouring, terracing, or strip cropping may require a good deal of fitting and trying. Invariably a considerable amount of field work must be done before the final plan can be written up. The field work is done by the district personnel. It often happens that the final plan requires special consideration of certain nursery crops in terms of the over-all cropping pattern. In such cases the regional nurseryman makes a return trip, after the field work is completed, to assist the district personnel in the preparation of the completed plan. This procedure or regional office assistance is not as complicated as it may seem. Basically it is nothing more or less than the application of a training function. Thus we "kill two birds with one stone." We do a training job and at the same time get conservation on the land.

Although planning a commercial nursery looks pretty complicated at the start, there are few cases where the farm planners do not feel pretty well equipped to handle these jobs after they have had assistance on the first two or three plans.

DROWNING ACRES *(Continued from page 11)*

sands, which would be unproductive even if drained. Another area of 800 acres was found to be unsuited for crops because of flooding by streams.

On the other hand, the soils technician found extensive areas of potentially productive land which, if cleared, drained, and put into cultivation would produce high yields of food and feed crops. Altogether, there were some 13,000 acres of this land, the extent and exact locations of which were shown by the survey. It was then a simple matter for a planning technician to de-

velop a land-use plan that would adapt the type of farming operations desired to the capabilities of the land.

The farming program called for an increase in the herd of Angus cattle from 300 to 1,000 head, an increase in bronze turkeys from 5,000 to 15,000, and of Hampshire hogs from 300 to 1,200. In order to provide sufficient feed, it would be necessary to increase the cultivated land from 605 to 3,105 acres. It would also be necessary to increase the improved pasture to 1,000 acres. An area of about 2,000 acres of woodland was planned for intensive development for quail shooting, with approved forestry management on 15,000 acres of woodland.

To meet the requirements for food and feed crops, it would be necessary to develop a minimum of 2,500 acres of new land. An area of approximately 2,500 acres of extremely flat land on the western part of the farm was selected on the basis of soil types and their capability to produce feed crops. Bladen, Dunbar, Scranton, Portsmouth, and Bayboro soil types were predominant.

The surface soils classified as sandy loam to loam, varying in depth from 6 to 18 inches, and were underlain by clay and sandy clay mottled subsoils. It was found that they could be drained and were of a structure heavy enough to prevent excess leaching of plant food. Laboratory tests showed that the pH was about 5.0 and that the

potash content was low. Good yields could be obtained from these soils with an application of 1 ton of lime per acre, 1,000 pounds of basic slag, and small amounts of potash.

To date, the number of cows has not been increased materially, because the pasture development program is still incomplete. But there are 600 hogs and 15,000 turkeys on the plantation and 40,000 day-old poults were sold last year to farmers in adjoining communities. These poults were produced in a modern, temperature-controlled hatchery under the most exacting conditions. A turkey dressing plant processes turkeys raised on the plantation and is available for use by other turkey growers in the county.

On 650 acres of newly developed land, an average of 30 bushels of corn and 40 bushels of oats an acre is now being produced. An additional 650 acres of land has been drained, cleared, and will be in production during the 1947 crop season. Eleven hundred acres of pasture are in various stages of development. Three hundred acres have received complete treatment, 200 acres have been cleared of underbrush, and 400 acres are being logged.

Although the job of readjusting the land use is not yet complete, Milbank is pointing the way on Cypress Woods Farms to the profitable use of some 3,000,000 acres of similar land in the low country section of the State.

Protecting Soils in the U. S. S. R.

By Professor-Doctor S. S. Sobolev, Dokuchaev Soil Institute, Moscow, U. S. S. R.

ABSTRACTED BY D. B. KRIMGOLD . . . TRANSLATED BY THEODORA MILLS

This paper was prepared for SOIL CONSERVATION magazine. It was submitted to the American Embassy at Moscow by the U. S. S. R. Society for Cultural Relations with Foreign Countries. Prof. Sobolev's article gives an account of the history and extent of erosion and of erosion control practices in the U. S. S. R. To make this interesting information available to nontechnical as well as technical readers, we obtained the author's permission to present an abstract of his paper in this magazine and to publish the unabridged version in one of the more technical journals. The article has been published in full in the July issue of the *Journal of Soil and Water Conservation*.

Prof. Sobolev is one of the leading soil conservation workers in the U. S. S. R. His report on snow retention, shelter belts, and the water and wind erosion data, included in this abstract, should prove

particularly interesting to soil conservationists in the Great Plains and in the Northern States.—The Editor.

THE U. S. S. R. has been an agricultural country since ancient times. Its continental climate and dissected relief have contributed to the development of erosion. The first accounts of erosion in the Dniepr Basin date back to Herodotus in the Fifth century B. C. Ancient Russian documents and other sources of the Twelfth to Sixteenth centuries contain references to gullies, eroded soils and dust storms. Erosion developed,

chiefly, near fortified cities where the farm population sought protection from nomads.

The second period in the development of erosion began with the reforms of Peter the Great (1718) and the establishment of serfdom. Erosion developed rapidly in the overpopulated central zone and in the northern zone near Moscow, Suzdal, Vladimir, and Ryazan, but in the black soil zone, from which the Russian people were temporarily forced out by the Tartars, there were virgin steppes.

The third period begins with the liquidation of serfdom.

As a result of the reform, the center of agriculture for half a century (1861 to 1913) shifted to the black soil provinces. By the end of the period, according to the account of academician L. I. Prasolov, three quarters of all the land under cultivation was found within the limits of the black soil zone. The greatest damage was caused by gully erosion to which the small peasant holdings contributed, but *sheet erosion did not develop as seriously as in the United States where the proportion of row crops was considerably higher than in Russia.*

The fourth period, which began in 1917 after the October Revolution, is radically different from the first three. The land was nationalized and the small holdings were combined into large, highly mechanized, collective farms. After collectivization, the boundaries of the tiny peasant plots, which concentrated water from melting snow and rainfall, disappeared. The growth of gullies in a number of districts was retarded and, in some places, ceased altogether. *Deep plowing with tractor-drawn plows, correct crop rotations with perennial grasses, and improved practices—all contribute to the better growth of crops, which protect the soil from erosion, and to the formation of stable, crumbly soil structure. Surface run-off is decreased and the task of combatting destructive erosion is lightened.*

The U. S. S. R. is a tremendous country. The agricultural belt is characterized by a climate of the continental type, which sharply distinguishes the U. S. S. R. from the countries of Western Europe and from a large part of the United States.

The winter in the U. S. S. R. is long and severe with the ground deeply frozen and with abundant snow cover. *The rapid thawing of the snow in the spring and the heavy runoff of melting snow causes severe erosion and the growth of gullies. In the*

south and southeast of the U. S. S. R., strong, dry, hot winds contribute to the development of wind erosion. Wind erosion in the winter is widespread in the U. S. S. R. During severe blizzards, the wind tears off the snow cover, destroys the soil and ruins winter crops over large areas. Snowdrifts mix with dust; this is why winters, with severe wind erosion, are called "black winters." Destructive cloudbursts, which erode the soil, are most frequent within the borders of the Ukraine and of Moldavia, in parts of White Russia, in the Caucasus, in Transcaucasia (Georgia and Krasnodar Region) and in the Far East.

The relief of Central Russia is sharply dissected with gullies and deep river valleys and is susceptible to erosion. In the central and southern belts of the European part of the U. S. S. R., about 125 million acres (about 35 percent of the arable land) are on slopes steeper than 3.5 percent; about 40 million acres are steeper than 7 percent; and about 15 million acres have slopes steeper than 10.5 percent. *The steepness of the slopes is not, however, the only factor in the development of erosion; the shapes of the slopes are also important. The several types of slopes can be grouped into three basic forms: convex, straight and concave. When combined, these elementary forms give compound forms: convex-concave, and others. Soil destruction is greatest on convex segments of the slopes, and least on the concave parts. In case of compound slopes; the steepness and length of the slope plays a less important role than the sequence of the adjoining segments.*

In wind erosion in the U. S. S. R. the following principles are recognized: *With the same soil cover, valley floors and depressions suffer the least while prominent relief features, such as "breaks," ledges of terraces and other so-called windswept slopes, suffer the most.* The damage from wind erosion is greatest on convex slopes, less severe on straight slopes, and least of all on concave slopes. The more abrupt the break of a cultivated, windswept slope, the more pronounced is wind erosion. Gradual changes in the rate of wind erosion are associated with gradual changes in the degree of slope. In 1934 the gullied area in the U. S. S. R. amounted to 11 million acres. *The annual loss from gully erosion, prior to 1917, was approximately one-fourth million acres.* In the arable plains of European U. S. S. R., approximately 74 million acres have suffered to some extent from erosion; about 27 of the 74 million acres have already been eroded and

to a noticeable degree have lost their fertility.

It is estimated that through water erosion about 247,000 acres of fertile land in European Russia are annually transformed into less fertile or, even, unsuitable waste land.

According to the calculations of academician L. I. Prasolov, there are in the U. S. S. R. 480 million acres of light-textured soils. Incomplete data indicate that by 1937, 36 million acres of these soils were destroyed by wind erosion. Assuming an annual increase of 1 percent, *the annual loss of arable land and pastures from wind erosion, prior to 1917, constituted approximately 360,000 acres.* Wind erosion has been especially destructive in the cattle country of Kazakstan and in the deserts of Central Asia. Here, out of 32.4 million acres of sandy and sandy loam soils, wind erosion has destroyed 18.3 million acres, or about 57 percent. Recently, problems of erosion have been seriously complicated by the rise of a new type of erosion—war erosion. The heaviest battles with the Germans were fought in districts where every break in the soil cover frequently leads to the development and growth of gullies.

PRINCIPLES OF EROSION CONTROL

In the U. S. S. R., the following erosion control and runoff retardation measures have found the widest application: (1) Snow retention and regulation of the runoff from melting snow. (2) Crop rotations with perennial grasses and improved farming methods. (3) Shelter belts. (4) Other measures, involving improved farming practices.

Ever since the middle of the last century, snow retention has been practiced with the use of mobile snow fences. (B. Titov, 1868): On plowed fallow land, solid screens are placed on the contour, to cause the snow to drift along the contour. The drifted snow acts like a dike or terrace; it retards the flow of water from melting snow and controls erosion. Extensive use is made of screens of sunflowers planted in double rows on summer fallow at intervals of 11.8 feet (the width of a tractor cultivator). The sunflowers are planted in the summer, which does not allow enough time for their stalks to become stiff enough to hinder the sowing of winter crops. The practice of interplanting colza or rape with winter grains for the retention of snow dates back to the end of the last century (I. Brounov, P. Kostychev). Snow retention protects the soil from wind erosion; protects crops from winter kill; decreases the depth of freezing; raises the permeability of the soil; decreases surface runoff; and increases soil moisture. Therefore, snow retention, which is one of the powerful means of controlling erosion, also, noticeably raises the yield of agricultural crops.

Run-off from melting snow is regulated in two ways; by utilizing the snow itself and by creating obstructions on the surface of the soil. In utilizing the snow itself, *the objective is to induce uneven melting of snow so that the*

thinner mantle between the snow ridges will melt earlier and the soil will thaw out sooner and will absorb some of the water, while the contour ridges of unmelted snow will intercept the runoff.

Contour cultivation and contour ridging (terracing), basin listing and check-rowing have been employed by a series of experimenters (Shishka, 1840; Shishkin, 1873; Yankov 1891; Dokuchaev, 1894; Shalabanov, 1903; and others). Their studies showed that these methods often increase the supply of available moisture in the ground 2 to 2½ times, and at the same time control erosion.

Very great significance is attached in the U. S. S. R. to the improvement of the structure of the soil and increasing its resistance to erosion. Dokuchaev, Kostychev and, later, Williams emphasized the role of stable, crumbly structure of the soil in controlling erosion and obtaining consistently high crop yields. Along with good tillage practices, crop rotation with perennial grasses are of great importance in creating such soil structure. Crop rotation with one or two fields of perennial grasses are now being introduced everywhere in the U. S. S. R.; they are already being followed on an appreciable area. Special rotations, with three or four fields of perennial grasses, are used on areas with severe water and wind erosion. In arid regions, the rotations include five fields of perennial grasses; bare fallow and intertilled crops are largely eliminated.

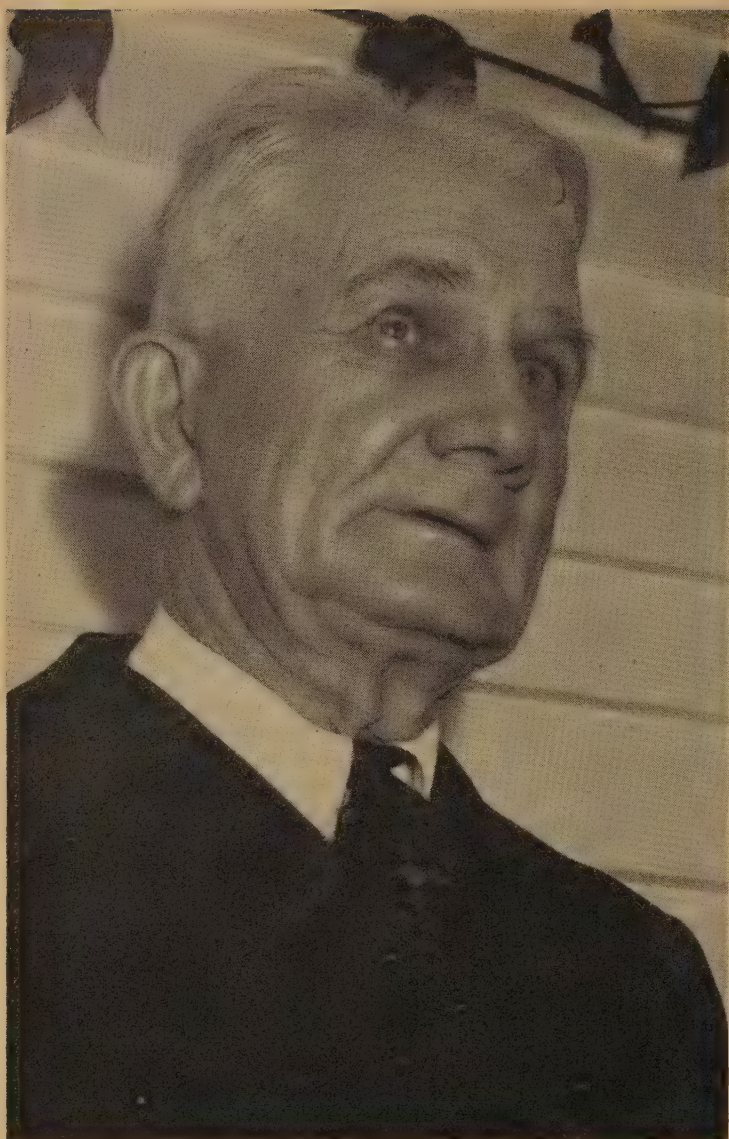
Shelter belts have been used in the U. S. S. R. since the beginning of the Nineteenth century. In 1809, Lomikrovskii began the first experiments on shelter belts. In 1837, he published a book, in which he set forth a sound system of woodland farming. Before the war (1932–37), about 168,000 acres of shelter belts were planted annually on cultivated land in the U. S. S. R. Over 64,000 acres of sandy soils and about 57,000 acres of gullies were being stabilized, and planted to trees annually. For the protection of cultivated land from wind erosion and drought, shelter belts of seven to eight rows in width are used;

Twelve years of observation at Kamenno-Stepnoi Experimental Station demonstrates that the yield of rye on the fields protected by shelter belts is 18 percent higher than on the open steppe. The favorable effect of the shelter belts is particularly pronounced in years of drought and of dust storms. Densely forested strips, 65 to 165 feet wide, are one of the means of stabilizing gullies. The purpose of these strips is to collect snow and to prevent water from melting snow from getting into the gullies. In addition to the usual hydraulic structures—flumes, drops, retaining walls, etc.—living barriers of willow stakes and tree planting in the beds of the gullies have been extensively used in the U. S. S. R. as far back as the Eighteenth century. Since the end of the Nineteenth century, diversion terraces and diversion ditches have been employed to prevent storm water and melting snow from reaching the heads of gullies. In addition to those described above, the following soil conserving practices are widely used in the U. S. S. R.:

(1) Plowing on the contour to a depth of 8 to 11 inches and deeper, which contributes to the absorption of melting snow,

(2) Plowing, cultivating, and planting across the slope,

(3) Strip cropping and reducing the width of cultivated fields on steep slopes.



Kentucky's Man of Action.

DISTRICT PROFILE

A.
THRELKELD

"THE SPARK-PLUG," Kentuckians called this man.

In other states we have heard these fellows called "The spearhead — ramrod — go-getter — wheel-horse."

But regardless of what folks dub them, they are stepping out with a go-gettin' leadership.

Now, this "spark-plug" of the bluegrass, who is A. Threlkeld, president of the Kentucky Association of Soil Conservation District Supervisors, is one "go-getting" example.

What did he get? Plenty.

Back in 1944 when he heard of a soil conservation essay contest "down in South Carolina," Mr.

A. scratched his head, didn't say anything, put gas in his car and headed for Louisville. He could speak for his association's board who had come to expect things from Mr. A.

"I've been down to Louisville and I saw Mr. Barry Bingham (president of the Courier-Journal, Louisville Times Publishing Co. and radio station WHAS) and he is going to sponsor the thing with us," he told his wife that night.

"What thing?" Mrs. Threlkeld asked.

"A soil conservation essay contest for Kentucky."

That year, Kentucky school kids showered Mr. A., Kentucky agriculturists, and the Louisville paper with 1,714 essays. Next year they swamped officials with 4,636 papers. And in 1946 Gene Hagan of the Monroe County district wrote his way to win against 8,968 entries, and tote off a \$100 bond. Gene said, "Soil erosion is the No. 1 problem of Kentucky agriculture." The Courier-Journal, the Louisville Times, and radio station WHAS, offered \$2,075 in savings bonds. An extra \$2,712 was added by the county Farm Bureaus, boards of education, civic clubs, merchants, bankers, and district supervisors.

"We have had inquiries about this contest from Maine to Seattle," Mr. A. relates. "Teachers learned, too. Mrs. Lucille Brown of Dry Ridge School told me, 'I found out more about soil conservation in judging those papers than I ever dreamed about.'"

Mr. A. stroked back his white hair, looked at us with his deep, Abe Lincolnish eyes, and dropped us a bit of wisdom. "You can get better results with direct contacts," he said, "than with the mails. You have got to sit down and talk with people to get things done. And you have got to carry them and show them. People see these things changing and they are convinced. All the mail and everything wouldn't do it. Let 'em see it and they will believe."

However, Mr. A. does write letters. To make better use of the aid of the Soil Conservation Service, he and several other supervisors took the lead for a State association and sent letters to the 450 supervisors of Kentucky's 90 soil conservation districts asking them to meet at the University of Kentucky livestock pavilion, where the State Association of district supervisors was formed.

But, merely organizing wasn't enough—Threlkeld leadership was plus stuff. "We had an organization," Mr. A. said, "but, we didn't have any

funds to operate on. We couldn't ask the State to allocate funds to us, because our association wasn't a legal part of the State."

Mr. A. called together the directors of the State association. Framework for the new State division of soil and water resources was born. The State legislature adopted it. A commissioner was provided, from each congressional district, who had to be a district supervisor. The soil conservation districts in each congressional district were to nominate 2 supervisors, 1 from each of the 2 major political parties. And from the list of 18 the State Commissioner of conservation would appoint 9, not more than 5 of whom could be from any one political party. "We wanted to keep politics out of it," Mr. A. said. The commission has employed Marshall W. Qualls as their full-time executive director.

Purpose of the commission is to assist districts in getting conservation on the land.

Per diem for supervisors when attending local meetings is provided, also, \$60 per year miscellaneous expenses for each district. The 1948 fiscal year provides \$136,000 to be granted to districts for soil-conservation equipment and used by the commission for other purposes.

"This equipment money," Mr. A. declares, "is inspiring more interest among supervisors than anything, ever. It is bringing them to realize that it is their duty to see that the soil program goes over. They have got to act on spending the money, and when a man acts he gets interested. We are telling them, 'You are supervisors, this is your responsibility'."

On July 1 and January 1, Kentucky supervisors get out the four-page Kentucky soil conservation News Bulletin which carries the better-soil drive from the State association of district supervisors.

Another activity, the State association encourages local leadership with master conservationists awards. A district cooperator may qualify "By having all practices in the farmer-district plan established on his farm and by being recognized as a leader in soil conservation."

We are sitting here at Threlkeld's (he spurns bouquets, says all the supervisors should be credited), we are in this country where the Ohio makes that big hump in the northern Kentucky outline. Mr. A. watches a blizzard raging outside; night is coming, and we rise to go before we are snowed in. "We've got another contest coming up," Mr. A. spoke. "One for the contestant who, during the

contest period, makes the most progress in establishing a conservation program on his farm. First prize is \$250. Second, \$150. And third, \$100. Certificates of award will be presented to first-place winner in each soil conservation district."

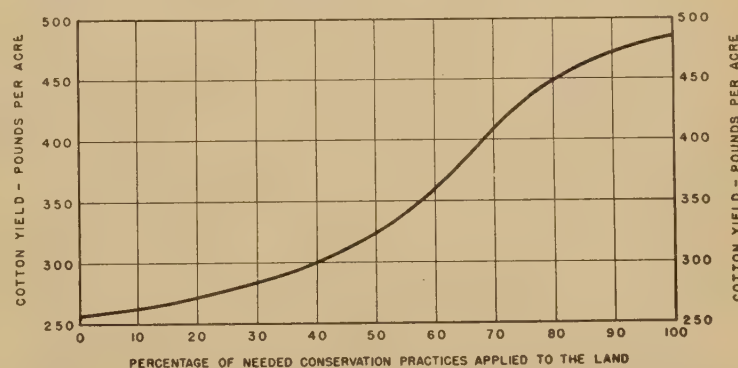
Mr. A. is one of the 9,000 district supervisors in America who are sacrificing badly needed time from their own farms and ranches to help their fellow men, working without pay because they believe in soil conservation. This year Mr. A. flew to Chicago to help organize the permanent national association of districts.

Mr. Threlkeld is president of the northern Kentucky PCA, a commissioner and vice chairman of the Division of Soil and Water Resources, the president and director of the State association of soil conservation district supervisors, chairman of Grant County, Soil Conservation District, board of supervisors, a director of the National Association of Soil Conservation District Governing Bodies, a director of the Kentucky Burly Tobacco Growers Cooperative Association, and an elder in the Christian Church.—JOHN MCKINNEY.

MORE CONSERVATION—MORE COTTON.—The accompanying chart shows the relation between cotton yield and the amount of needed conservation practices applied to the land. It is based on survey records of 300 cotton farms in the Southeast where application of conservation practices varied from 0 to 100 percent. The 300 farms were selected at random from groups comparable in size, soils, topography, cropping practices, and land capabilities.

The study showed that while it takes time to get a conservation program going, the effects accumulate as more and more practices are applied, until yields begin to level off as the plan nears completion. Farms with a conservation "score" of 20 had yields only slightly higher than those with a score of 0. From 20 to 50, the increase in yields was fairly rapid. Between 50 and 80 the greatest increase occurred. After the score passed 80, the yields continued to go up, but the increase was less pronounced.

These results emphasize the need for a complete soil conservation program applied to the land.



NOTE.—Data prepared by De F. Hungerford and Robert W. Andrews, regional project plans division, Soil Conservation Service, Spartansburg, S. C.

REVIEWS

TOMORROW'S FOOD. The coming revolution in nutrition. JAMES RORTY AND N. PHILIP NORMAN, M. D. PRENTICE HALL, 70 FIFTH AVENUE, NEW YORK 11, N. Y.

"Tomorrow's Food" lives up to the title very well in bringing the reader to face the future problem of food, not only in terms of quantity, but more so of its quality, which means health. The authors have done well in digesting the scattered, and less commonly read, technical works of excellent authorities. They have put into interesting and challenging reading an able interpretation of these different parts of the more complete picture.

Rorty and Norman have developed the broader subject of food from the ground up. Their first premise is that food should be the basis of good health. Good food is disease prevention to them. They cite primitive folks whose natural foods, grown on carefully conserved and well-manured soils, have made unusually healthy and vigorous bodies. They cite cases from the studies by McCarrison and the extensive travels and detailed records of Dr. Weston A. Price, who found many primitive peoples with such sound teeth that for them the dentists had taken a holiday.

According to the authors, our food problem is economic, social, and political, as well as nutritional. The draft rejections—188,000 for defective vision alone, out of the first million—and surveys during depression times reporting that 75 percent of the people of America, especially those in the low-salary bracket, are malnourished, are taken as indicators of poverty as the close associate of this unfortunate nutritional situation.

As a people we have taken on perverted food habits. We have brought on troubles in reproduction suggesting that we must look to better food for better babies. But with better food there must come some changed social practices as well. Scientific helps need to be called to our aid for food as health rather than food for profit only. "Food perversion," as the authors call it, is given a frank and honest presentation. Industrial conversions of our foods, too little of them taken in natural form, and our readiness to lean on drugs and artificialities, are basic troubles. "There are many more nutrients in natural foods than the synthesizers have synthesized, and the deficiency (*in the health of a person*) may arise from the lack of one or more of these natural unknowns. Usually the patient is suffering, not from one deficiency, but from several; and always what is involved is a complex inter-relationship of vitamins and minerals . . ." For the authors, and one of them is an M. D., food quality must be grown into it from good, fertile soil, and cannot effectively be thrown into the diet by the apothecary's shop.

Domestic animals know their food quality and such animals can be used in their feed choices to detect soil deficiencies. We had to let rats show us that they have the "ability to choose a balanced diet without help of national nutrition programs, advertising copy writers, home econo-

mists, dieticians, or nutritionists." "Poor whites" in the South eat clay to cure anemia. Pregnant Negro women with low hemoglobin levels travel long distances to gather "stump dirt," this being a kind of iron-bearing clay found where a tree blows over and brings the soil to the surface.

Our perverted food habits, our emphasis mainly on calories, our purchase according to bulk, and our submission to propaganda and advertising, have not given us the wholesome, freshly ground, whole-wheat bread. Instead, much has been milled out, and then the flour values supposedly restored by "enrichment," only to let us lean on the "broken staff" of life. "Profit motivations, then, intensify the biologic wreckage already wrought by soil exhaustion." All of the factors, economic, social, agricultural and otherwise, disturbing the quality of our food are fairly and forcefully presented in giving answer to the question "what's wrong with American food?"

That our food problems are not hopeless and insurmountable is the theme of almost half of the book. The sciences, agriculture, processing, labelling, and distribution of food can all be tools of liberation from self-wrought bondage. Already pilot-plant performances, and trial areas are pointing the way. At the very foundation are the soil and its exploited fertility.

Carbohydrates are easily grown, and often serve to exaggerate the crop's output as bulk, all economically enviable, but nutritionally damnable. If soils are to produce protein in abundance they must be built up in fertility. Carbohydrate conversion into proteins is inefficient when "an acre of grains, sugarbeets, potatoes, or other carbohydrate-producing crops will give only 70 pounds of protein in the form of milk or beef after it has been fed to cattle, and yet this same carbohydrate used to produce yeast gives 840 pounds of equally good protein." We might well add that soils commonly growing sugar that were given proper soil treatments, such as fertilizers, and put to grass, have been known to produce almost a ton of beef per acre. Soils fertile enough to grow alfalfa will synthesize as much as 1,500 pounds of vegetable protein per acre per year in this crop for animal feed or harvest. Agriculture is, after all, the starting point of, and the hope for, the solution of our food problems; and the soil fertility is the determiner of the nutritional quality of the creations of this great outdoor industry.

The authors make a strong call for some crusaders today as we had them in the past. Muckraking, once liquidated, might well be restored to revivify "free enterprise" as a vital American reality. Labeling and processing call for reworking in the light of our better health information and under the vigor of a former Dr. Wiley, and in the public spirit prevailing before the scientists sat so regularly at the same table with the banker and the industrialist.

The Blitz of the Britons left them with better health after the war's end than in 1939. It came from the planning by all forces. Our planning the food of tomorrow calls first for the scientists who are not afraid to give a minority report. Even then, after food fundamentals are accepted in principle, much needs to be done to feed people well. Here may need be some revolutions in processing, and distribution, not only on a national, but on a

(Continued on page 23)

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REVIEWS (Continued from page 22)

global scale. "It is for the food and agricultural organization of the United Nations to assert the mastery and fulfill the hope, that hunger and war must be banished from the stage of history.

Anyone will read Tomorrow's Food as a stimulus to his own thinking, whether or not he agrees with all it presents. The reader will see tomorrow's food as a problem in agriculture, and as plenty of reason for more concern about the soil fertility as basis for good nutrition. He will appreciate the political implications of tomorrow's food problems that were already familiar to Seneca, that famous writer of Roman times, when he said "A hungry people will not endure reason, they will not listen to justice, they will not bend to any prayer for mercy."—W. A. ALBRECHT.

¹ From the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C.

SOIL CONSERVATION AND FARM MANAGEMENT

"MAN is the product of his environment." This old quotation applies perfectly to the modern farmer who practices soil conservation.

It has been my observation that conservation farmers usually become better all-around farm managers. Some folks have tried to differentiate between conservation farming and farm management. They say, for instance, "These are conservation practices, and these are good management practices." I think they are mistaken. Certainly, the development of a conservation program is the first, basic, step leading to a complete plan of management for an entire farm unit. Once such a plan is put in effect on the land it becomes a sound and enduring foundation upon which to build a better livestock program, a workable financial plan, crop improvements, and all the other phases of good farm management. It is equally true that the full benefits of a conservation farm plan will not be realized unless the other elements of good farm management are also brought into play.

I have noticed that farmers who have taken the first step of planning their farms for conservation usually take the next steps leading to a complete management plan. As the adoption of conservation steadily improves and safeguards the productive capacity of the land, the next logical step is to use improved varieties and strains of crops that will more fully utilize that productive capacity. When pasture fields provide feed all season long, when the hay contains legumes, and there is plenty of feed with some left over, then indeed there is real inducement to improve and increase the livestock. The added business thus made possible is on a sound and continuing basis.

Once a conservation plan has been put into effect the farmer is no longer worried over such questions as, "Shall I buy that new improved strain of seed—or would it wash out?" "If I apply lime-

stone and fertilizer, will my crop yield enough more to pay for it?" "Will it pay me to buy some better cows with the feed I have available for them?" With a conservation plan on the farm he can move ahead with confidence that his crops will not be washed out, that his yields will be good, and that the quality of his feed will be high.

One of the marks of a good farm manager is doing things on time. He contrives to get his crops in when they should be planted, and to harvest them when they are ready. No matter how carefully these operations may be timed, the weather often interferes. But the conservation farmer who has planned his operations to fit his land, who has developed an effective system for the management of water, and has supplemented these with the necessary soil and water conservation practices, has greatly reduced his chances of delays because of weather. He will often be able to work his land days earlier than otherwise. His crops grow better and mature faster, once they are planted. And when harvest time comes around his equipment will not bog down in a wet spot or be broken in crossing a gully. Thus, his conservation plan has helped him to get things done on time—to be a better farm manager.

Yes, truly, "man is the product of his environment." If he continually gazes upon a landscape scarred by gullies, fields stripped of productive capacity, pastures that are little more than exercise lots under the hot summer sun, he is almost sure to lose his desire to think ahead and plan improvements. On the other hand, when he sees the results of his conservation planning spread upon his fields, pastures and woodlots, he is inspired to move forward, to seek better things for himself and his family. I have observed that conservation farmers usually become better all around farm managers.

AN EDITORIAL BY
A. M. HEDGE



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WELLINGTON BRINK

Editor

Art Work by

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HAPPY HIGHWAY!—The Melbourne Iowa, Community Club is cooperating with the Marshall County Soil Conservation District this year in an effort to get farmers along State Highway 64 to apply soil conservation to the land. Highway 64 was selected by the district commissioners because they felt that most of the problems found in the district existed along that route.

At the request of the district, the club, which has been active for 27 years and has a membership of 210 in a town of about 500 people, appointed an agricultural committee to work with the district commissioners, the county extension director and the Soil Conservation Service.

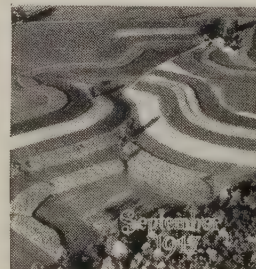
A list of 41 persons owning land along the highway was divided among five 2-man teams. The teams included three district commissioners, the county extension director and the district conservationist. Each of these men was teamed with a member of the Community Club. All owners along the highway were interviewed. As a result, 39 of the 41 land owners and operators signed requests for assistance in planning farms for soil conservation.

The entire group of farmers and land owners was invited to a public dinner and program sponsored by the Community Club. After the dinner the applicants for assistance were called together to hear a discussion of land capabilities, the effectiveness of different kinds of soil conservation practices, information on rotations and soil treatments, and a discussion of complete farm planning. Afterward, the 30 farmers were divided into 4 groups and 4 layout demonstrations were planned. Some of the work to be done includes strip cropping, terracing, waterway, gully control and pasture renovation.

Radio Station WHO at Des Moines and local newspapers have given the project considerable publicity.

—R. H. MUSSER.

THE COVER.—George Lowary's arresting picture dramatizes the soil conservation story as seen in the vicinity of Lancaster, Pa. This is one of the Nation's most celebrated farming areas—but all agriculture looks and is better as the obsolete pattern is replaced by one featuring alternating contour strips of cultivated and close-growing crops.



All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

What to do about **CRAYFISH**



By Verne E. Davison

CRAYFISH (or "crawfish," if you prefer) for years have taken much of the profit out of farming for many families on the prairie soils of Mississippi and Alabama. They feed mostly at night, when rains and heavy dews keep their moisture-needing bodies from drying out. The prairie crayfish (*Cambarus hagenianus*) live in burrows, each hole a veritable well in which they keep their bodies immersed. Sometimes the hole stands full of water. Or the crayfish may find water 10 feet or more below the surface in times of drouth. Their food is organic matter, almost anything. But young cotton, or corn, or oats, or grass is crayfish food which farmers can't spare.

A crayfish burrow per square foot of land, more than 40,000 to the acre, has been counted. Five to ten thousand holes, 1 to the square yard, are not uncommon. To each burrow an average of 5 or 6 lusty lobster-like animals may be found, according to Dr. Clay Lyle, Mississippi State Entomologist. In a single night—warm and rainy—the thousands of greedy claws can reach out and snip a tender new crop down to the bare soil. Sometimes the weather favors the cotton farmer, staying dry until the cotton gets too tough for the crayfish to cut. Most years, however, farmers plant parts of their cotton and corn fields 2 or 3 times before the weather and the crayfish permit a satisfactory stand. Less spectacular but equally important is the damage to oats in winter, and to pasture and hay in summer.

Summing it up, K. P. Gatchell, Soil Conservation Service technician, Columbus, Miss., said, "I have no idea how many farmers have gone broke and lost their land because of crayfish."

S. A. Robert, agricultural agent for a railroad which hauls agricultural products from the crayfish lands, carried on a vigorous campaign to get something done to control the arch pest. He called on the agricultural experiment stations, the Fish and Wildlife Service, and other bureaus for help. He wrote to Dr. H. H. Bennett, chief of the Soil Conservation Service. He argued, "Someone ought to learn how to control these destructive, aquatic land marauders."



NOTE.—The author is Chief, regional biology division, Soil Conservation Service, Spartanburg, S. C.

Allison Hardy, chairman of the commissioners of the Lowndes County Soil Conservation District, always asked at district meetings. "Why can't we do something about crayfish?" He knew prairie-soil farmers could not control erosion where crayfish cut the vegetation and buried it far below the force of the battering raindrops. The soil thus exposed was carried away in every rain to the Tombigbee River and its tributaries. "Crayfish are the worst pest of such soil-conserving crops as oats and hay, legumes and grass. It's the worst pest of cotton and corn. It's a mean problem in soil conservation," it was generally agreed.

There is a method of killing crayfish, but farmers find it difficult. Crayfish are readily killed by chemicals placed in the water in the burrows. Their tender bodies cannot withstand the poisonous effect of a drop or so of turpentine, or creosote, or of numerous other things. So the treatment was developed to put a little killing agent into the water of the thousands of little wells.

But Robert and Hardy, and Soil Conservation Service technicians assigned to the district, agreed with the farmer opinion that the method was too laborious. They set out to find something simpler, more practicable. Robert's railroad provided some funds and materials. The district commissioners insisted that technicians help them find ways to control crayfish. A plan of attack was agreed upon. At odd times technicians Gatchell, Morris, and Williams tried a number of things on small areas of heavily infested fields, such as tung meal, castor bean meal, cyanamid, heavy applications of barnyard manure, and residue mulches with varying degrees of success.

Later DDT, which was suggested as being deadly to crayfish, was tried by individual hole treatment. It proved to be successful. It was then sprayed on cottonseed and the seed scattered on top of the soil, as a poison, after Ezell Orr, Negro farmer remarked, "Crayfish likes cottonseed better than anything." He was also supported by William Sanders, another Negro farmer who stated, "Crayfish will take every cottonseed you fail to cover when you plant."

The technicians figured on the crayfish poisoning their own water. They did just that. They found that a single cotton seed treated with a solution containing 2½ percent DDT would kill a crayfish in a few hours, merely by the poison being dissolved into the water.



Crayfish mounds are familiar chimneys on the prairie landscape. Combines and mowing machines find operation difficult because of clogging of cutter bars.

I saw dead crayfish on fields that had been poisoned with a bushel and a half per acre of cottonseed treated with DDT. I helped count the dead animals on land where ground-up corncobs (DDT treated) had been scattered at the rate of 100 pounds per acre. I saw a field of oats. Half of it was almost free of crayfish, killed a year earlier by Gatchell on his farm under the new control. The other half of the oats, virtually destroyed, had been poisoned 3 weeks before I inspected it. Whitened carcasses of dead crayfish testified silently to the effectiveness of the Lowndes County Soil Conservation District's new soil conservation practice. Many of the crayfish die on the land. Probably just as many others succumb in their burrows. We saw them dying at the entrances.

Dan Williams, district conservationist, explained other details: "The poisoned bait cost nearly \$2 for enough to cover 1 acre. That's less than the cost of a bushel of seed for a second planting. We have been successful with dried sweetpotatoes, silage, and other baits, but corncobs or cottonseed have worked best. Farmers will save their cobs this year. There will be plenty of cheap crayfish bait in 1948. Farmers will treat at least 1,000 acres of crayfish-infested lands this year."

The blackbelt includes good soils. Crayfish live in all of them—Catalpa, Houston, Hunt, Sumter, Vaiden, Trinity, Kaufman, and the rest. Hardly a field of these good prairie soils is entirely free of crayfish.

"We felt it didn't do much good," Dan continued, "to help a farmer plan his crop rotations and better pastures when we all know the crayfish would damage the plants so much. We couldn't get help from anywhere, it seemed, so we did the best we could ourselves.

“Poisoning crayfish with DDT is new. And it’s practical.”

A farmer can spread the bait evenly over the field in any one of a number of ways. A home-made lime spreader works satisfactorily. Three or four hands can cover an acre in 15 or 20 minutes from a wagon. A cotton planter or drill can be used. Just get some seed or ground cobs on every square yard of the field and you’ll get a good kill.

Ideal poisoning time is warm, rainy weather. A farmer can’t always wait on or anticipate the temperature and rain. So they treat in April, May or June for spring work—October, November or December on oats land. A second treatment may be necessary. A third coverage several weeks later, just poisoning around scattered live holes, may sometimes be needed to finish the job.

How often a piece of land will need treatment is still a guess. A complete kill is not necessary, perhaps impossible. We’re uncertain as to that. Crayfish reproduce very slowly, and move into new territory just as slowly.

Technician Gatchell and his colleagues killed crayfish in January and February. But it isn’t

a good time to get high kills. Rains make the bait ineffective in 4 to 6 weeks. Heavy rains even wash the bait away. But prairie farmers now have assurance that soil conservation and higher profits can be enjoyed, for they won’t be “feedin’ so darned many greedy pests” in future years. It’s a good example of how local people can take care of a local problem.

The Mississippi Agricultural Experiment Station at Starkville is working on various refinements and measuring the results carefully. The Extension Service is putting on demonstrations of control. AAA payments of \$1.40 per acre treatment (1 limit 2 treatments) were approved locally in several counties.

The Government of India desires to obtain the services, on a three-year contract, of a team consisting of an experienced engineer, agronomist, and soil scientist of P-2, P-3, or P-4 grades. Good salaries and travel expenses. Write William X. Hull, Foreign Liaison Representative, Soil Conservation Service, Washington 25, D. C.



Whitening skeletons of crayfish poisoned by DDT. Note the new growths of grasses and weeds coming in to protect the soil.

TREMPEALEAU SCHOOLS



*Look at
The Land*

By Jack P. Dundas

IF TREMPEALEAU County has lost 6 inches of topsoil in the past 60 years and this is one-half of its original layer, how much topsoil will our farms have in the year 2,000? This question and many others relating to soil were considered by every seventh and eighth grade rural school pupil in Trempealeau County, Wis., during 6 weeks of 1946.

Because many young people do not settle on farms or do not go on to high school, County Superintendent of Schools Dorris Sander was prompted to set up a teaching unit on conservation in the rural schools. She asked and received my own assistance, as the Soil Conservation Service farm planner, and that of Arnold Wochos, county agent.

A soil "clinic" was held with groups of 8 to 10 rural school teachers. The meetings started at 2 o'clock in the afternoon and ended at 8 in the evening, with "pot luck" supper at 6. Subject matter contained in the Wisconsin Extension Bulletin, "Save our Soil", was discussed by Gaylord Jacobson, Ken Nehring and me of the Soil Conservation Service Staff, and by County Agent Wochos. The latter's assistant, T. C. Main, (now the county agent) reviewed subject matter in this bulletin.

Other materials used at these meetings included profiles of local soils—both eroded and non-eroded—grass root and fertilizer samples, local soil conservation slides and sound movies. County

Superintendent Sander developed plans to have the conservation unit correlated with other classes. As a result, the pupils wrote themes, plays, poems, and songs on soil conservation as English assignments. In history and reading, stories were studied about the soil conservation work of early prominent Americans. Words concerning soil conservation were used for spelling lessons. In art classes, the students made posters, charts, and graphs on this subject. Arithmetic problems in applying amount of the various fertilizer mixtures were devised by teachers and pupils. News stories and pictures on soil conservation were used for scrap books. Short field trips were taken by the teacher and pupils to observe the subject matter studied.

A record sheet was supplied each teacher for keeping track of the activities carried on during the course. This was useful in connection with



Streambank erosion control and wildlife benefits under discussion.

NOTE.—The author is work unit conservationist, Soil Conservation Service, Whitehall, Wis.

awarding prizes to schools doing outstanding work.

At the conclusion of the study, 40 schools held community club meetings at their schoolhouses, drawing an aggregate attendance of 2,600. Everyone was invited. The programs included songs, stories, essays, poems, and plays on the subject of soil conservation. Representatives of the Soil Conservation Service attended the meetings, showed slides or movies, and gave short talks.

As examples of what the science classes did: The Ettrick State Grade School took a field trip to study floodwater, taking samples so that observations could be made on the amount of topsoil carried. The Sunnyslope School yard was endangered by a gully that had started in a nearby field. The teacher called upon Kenneth Nehring, of the soil conservation district, to assist in planning control measures. On Arbor Day the children worked on the ditch and planted trees on the school grounds.

To culminate this work, a series of 8 field trips was held early in May. A total of 975 children and adults visited farms cooperating with the soil conservation district, and saw samples of the things that had been studied. Holes were dug in the crop fields and in adjacent noneroded woodland areas to observe the variation in the depth and texture of topsoil.



Demonstrating tree-planting technique and care of planting stock.

They walked up and down slopes and on the contour to observe the ease of "working on the level". Strip cropping, alfalfa-brome grass, tree planting, pasture renovation, streambank erosion control and diversion terraces were noted. One unusual sight encountered was a large masonry flume that was completed in 1910 on the William Raichle farm.

Distribution of prizes marked the end of the project. The Trempealeau County Bankers' As-

sociation donated \$100. The winning school was awarded a 3-year traveling plaque. Four schools doing excellent work received framed soil conservation pictures. Ten schools doing very good work received certificates of merit. Nature books were presented as prizes for the best individual work. Every seventh and eighth grader participating received a "Save Our Soil" pin which made him a member of the Trempealeau County Soil Conservation Club.

This year a similar program has been projected on the subject, "Plant and Animal Life with Relation to Soil Conservation." The unit is divided into wildlife planting, birds, animals, trees, fish, snakes and frogs, insects, weeds, and school ground planting and beautification. Outlines for these subjects were prepared by the three offices. Prizes have been donated by the eight sportsmen's clubs in the county.



Pupils grade own quiz papers at end of field trip.

These two courses will be taught alternately every 2 years in all rural schools in the county. Each eighth-grade graduate will have received basic training in soil and soil conservation and its relation to plant and animal life. These future farmers will be better conservation farmers.

Unquestionably, this school undertaking has played a big part in the increased interest in conservation farming in the soil conservation district. In 1946 contour strip cropping increased 105 percent on noncooperating farms and 84 percent on farms of district cooperators over 1945. Many of the farms included in the 105 percent have now become cooperators with the district and are following complete plans for soil and water conservation. Although the youngsters will eventually themselves be responsible for this job, part of the pay-off is already being realized in increased application of conservation to the farms of parents and other adults.



Here is land being cleared the old way. Standing timber is cut and burned, instead of being harvested as poles, posts, and firewood. This way, it's all expense.

New Lands Opened in Green Mountain District

By A. E. McClymonds

Now and then soil conservation goes beyond its usual work of checking erosion on lands already used for farming or ranching, and actually assists in developing new lands. Some of these lands are being drained. Some are being brought under irrigation. Some are being cleared.

The Green Mountain Soil Conservation District in western Montana is one of these places. It lies in the heavily wooded, narrow, mountainous valley of Clark's Fork River, where men have settled to carve out homes from the wilderness. It extends from near the town of Thompson Falls westward to the Idaho line.

Green Mountain's farmers had hardly made a good start at clearing before they organized their soil conservation district. Now, land is classified as to its capabilities before clearing plans are made. The tragic mistakes of an earlier day are being avoided. In this the farmers have the help

NOTE.—The author is regional conservator, Soil Conservation Service, Lincoln, Nebr.

of Soil Conservation Service technicians, who also lay out the irrigation systems and help with conservation plans.

Methods are being used which lessen costs and remove many of the backaches from the clearing job. Because district supervisors have found markets, the timber that formerly was a bar to progress is now a good source of income. This enables the farmers to spend their time on their lands, instead of seeking outside employment in order to live.

It was in 1942 that the Green Mountain District began operations. It had been organized the previous November, including at first only 117,000 acres along Swamp Creek and the Vermillion River, tributaries of the Clark's Fork. Sixty families reside there.

Since then, the district has expanded twice. It now includes 770,000 acres, 300 families. Only 98,000 acres are owned by individuals. Nearly 570,000 acres, principally steep upper mountain slopes, are federally owned and part of the Cabinet National Park. The remainder belongs to corporations, the State of Montana, and Sanders County.

The area was logged in the 1890's and partially burned over in 1910. Present timber is second-



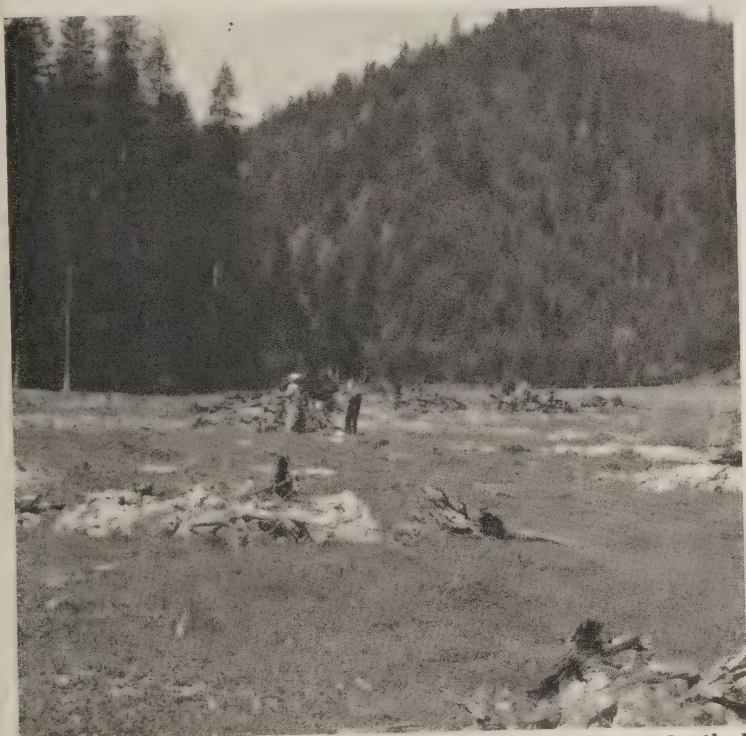
First stage in clearing. The wood products have been harvested and the brush piled for burning. This land has been seeded to a grass-legume mixture. It will be pastured 3 years while the stumps are curing. Removal of the stumps will be accomplished with a bulldozer and dynamite.

growth pine, fir, tamarack, and some spruce and cedar which has generally reached pole or post size.

Steepness of slope alone precludes the development of farmland on all but about 100,000 acres which lie in the valley bottoms and on lower slopes. Of this, only about 35,000 acres are suitable for cultivation.

While some settlement had occurred earlier, 82 percent of the present residents came to the area after 1930, most of them during the period between 1935 to 1937.

Most settlers were victims of drought elsewhere or of unemployment during the depression. They generally lacked capital, and the need for finding outside employment left them little time for clear-



Second stage. The stumps have been removed and piled for burning, along with brush which has grown during the period the stumps were curing.

ing. Three-fourths of the farms are 160 acres or less.

Soil conservation was not uppermost in the farmers' minds when they sought the help that led to organization of the Green Mountain District.

It was a worried group from the Swamp Creek community that called on County Agent "Rusty" Ralston one rainy day in the fall of 1940. An irrigation project which has been built to take water from Swamp Creek did not work. None was experienced in irrigation or understood the soils. Ralston started them on the way to organizing the district.

How the district idea has taken hold is indicated



Third stage. This land has just been broken with the district's heavy breaker-plow. It is now ready to be worked with regular farm equipment.

by the fact that in the 4 years since operations started, nearly three-fourths of the farmers have asked the district supervisors for aid. The technicians have helped more than 75 work out farm conservation plans and are at work helping as many more. This, in addition to the technical services in putting the plans into effect on the land.

Such help is especially important because of the harsh results in clearing land that may not be suitable for cropping. Much labor and expense during several years are required. If the wrong land is cleared, the investment is largely lost and the threat of erosion is increased.



Post-treating set-up used by Adolph Olson. Since this picture was taken, the farmers in the Green Mountain Soil Conservation District have established a marketing cooperative and treating plant, and two cooperators with the district have set up a privately owned plant at Thompson Falls.

Formerly the method was to fell the standing timber and burn it, then remove the stumps. It was all expense. The present method aims at salvaging the usable wood products, a step in line with the farmers' conviction that farming and wood production should go hand in hand as a year-long enterprise.

The first step—salvaging the wood products and felling trees—is slowest because it involves principally hand labor, and the number of trees capable of yielding poles, fence posts and fuel wood is large. Some trees have even reached saw-timber size.

Ordinarily, at least 3 years should elapse between the first step and the second, which is the removal of stumps and brush. Stumps are less difficult to remove when they are rotted somewhat. In the meantime, technicians advise the planting of legume grass mixtures, which add nitrogen and organic matter to the soil, furnished grazing and help combat growth of brush.

Removal of stumps, roots, and brush has been speeded up materially through the use of equipment. First, the larger stumps are blasted to pieces small enough for a man to handle. This also frees much of the earth from the stumps. Then a crawler-type tractor, equipped with a heavy-toothed blade similar to a bulldozer, makes short work of piling material to be burned. It rips up the brush at the same time it pushes out the stumps.

Breaking the land is the third step. It is done with a small crawler-type tractor and heavy breaker plow. Most of the "blind stumps" are plowed out in this operation and the land put in shape for farm machinery.

The present equipment is loaned to the district supervisors by the Soil Conservation Service. The supervisors rent it to cooperators at an hourly rate high enough to cover operator's wages, cost of operation and maintenance, and to provide reserves so that the district can buy new equipment when this is worn out. The hourly rates seems rather high, but land clearing costs have been cut in half.

Farmers find that the wood products which are salvaged just about cover the costs of clearing. Two examples illustrate this. One man hired the work done; the other harvested the wood products himself.

M. C. Sutherland had 30 acres to clear. The stand was principally tamarack, which yielded 13 cords of fuel wood per acre. He paid a wood cut-

ter \$3.50 per cord for cutting the wood, and hauling it to Thompson Falls cost \$1.50 per cord. It brought \$7.50 a cord, which gave Sutherland a net income of \$32.50 per acre.

Other clearing costs—powder, caps and fuse, labor for blasting, rent of equipment, burning piled debris, and breaking the land—amounted to \$42 per acre. This was \$9.50 per acre more than his net income from wood, an amount which was more than covered by an AAA conservation payment of \$10 per acre.

Adolph Olson on the Vermillion river harvested the wood products himself. A native of Sweden and experienced in woods work, he came to the Clark's Fork valley about 9 years ago. The drought forced him to move from Poplar, Mont.

He bought his 200 acres about 9 years ago. Thirty acres are classed as cropland, of which 13 acres had been cleared. Some which had been cleared should have remained in trees.

Olson was the first to tackle the job of making woods products from land being cleared supply the income to enable him to stay at home. He is now clearing 17 acres of land rated as excellent for cultivation if the proper conservation practices are applied. Technicians helped him select the marketable trees. It was necessary for the supervisors to help find buyers.

He cut, treated, and sold 2,800 fence posts the first year. He also sold 12,000 board feet of mine stulls. The next year he produced 3,500 fence posts from half an acre and a goodly amount of cordwood. His production records for 1945 are not available.

"I was surprised at what I earned getting out fence posts," Olson remarked. "My income has been the best I have had since I moved here."

Olson's experience led the supervisors to help the farmers form a marketing cooperative. Since then, Sutherland and Paul Harlow, also a cooperator with the district, have opened a commercial market at Thompson Falls. They have bought a post peeler and a pole peeler, which frees the farmers of one of the most arduous tasks in post and pole production and one which can be done best at the time when crops need to be seeded.

How the woods products business has grown is shown by the figures. Only one carload of fence posts was sold in 1943, and only two in 1944. In 1945, there were 15 carloads and the sales for 1946 were more than 50 carloads. In addition, Walter

(Continued on page 46)

Decade of PROGRESS



By R. W. Rogers and H. C. Fletcher

SOIL and water conservation in the United States in the last 10 years has gone ahead rapidly. Today there is more real conservation being put on the land than ever before. You may have seen it taking root and spreading in your own locality.

The work of the Soil Conservation Service has been carried on under two main phases; (a) demonstrations and, more lately, (b) extensive operations in cooperation with the farmers' soil conservation districts.

Effective soil conserving practices have been developed through experimentation and actual field trials. Effective conservation treatments, not necessarily all possible treatments, are now known for most parts of the country. The Service, in cooperation with state experiment stations, has determined many of the varying needs of the highly diversified land of the country. Its research scientists are continuing to develop new and better methods of holding soil and keeping the land productive. Their work is part of the coordinated tool for soil conservation—a tool that makes use of all the available measures needed for treating the land according to needs and capability, one measure to support another.

NOTE.—The authors are Division Chief and Assistant Division Chief of the Records and Reports Division, Soil Conservation Service.

Complete soil conservation planning and land treatments have been demonstrated to thousands of farmers and ranchers, who now realize the need for and value of proper land use and protection. The necessity of protecting their land resource has become of utmost importance to them. Most farmers have experienced erosion losses and land damage. Consequently, demonstrations and personal experiences have caused millions of owners, tenants and landlords to seek technical guidance in conservation.

Acre by acre, field by field, and farm by farm, the Soil Conservation Service has steadily widened its scope of field operations to meet, so far as humanly possible, the growing public demand for treatment of the land according to its capability and needs.

SOIL CONSERVATION DISTRICTS

IN APRIL 1935 Congress established the Soil Conservation Service as a permanent agency of the Department of Agriculture (Public 46 of the 74th Cong., approved April 27, 1935). Shortly thereafter the President proposed the adoption of a Soil Conservation Districts Law to the Governor of each State, as a guide for democratic action. A suggestive act outlined a procedure for the organization of soil conservation districts as governmental subdivisions of the States. Enabling



Contour cultivation : 3,275,000 acres.



Strip cropping : 601,000 acres.



Cover crops : 2,370,000 acres.



Seeding range and pasture : 1,647,000 acres.



Stubble-mulch farming : 5,108,000.



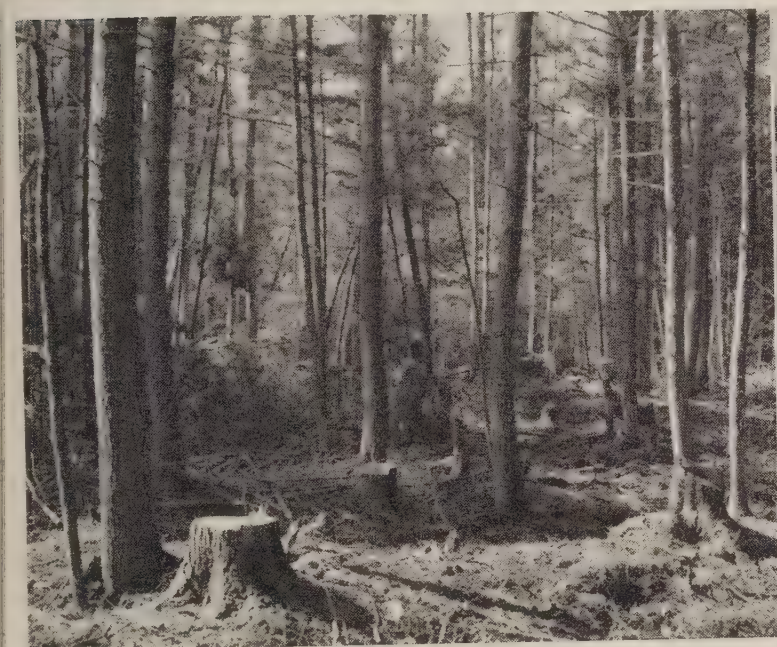
Number of farm and ranch ponds : 27,480.



Tree planting: 29,870.



Diversion channels: 3,370 miles.



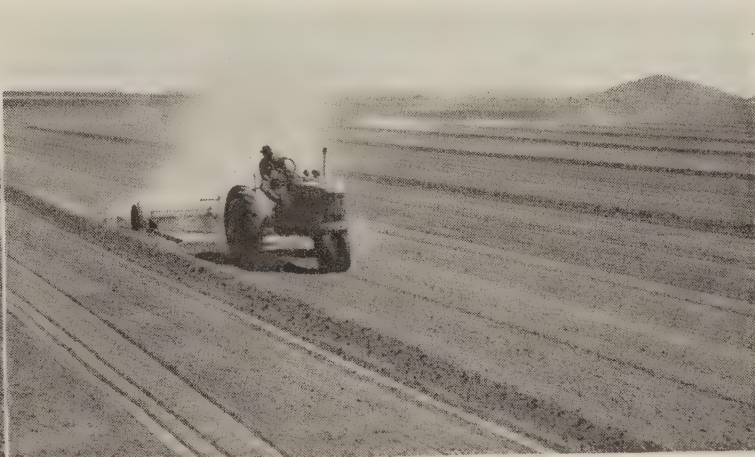
Woodland improvement: 1,606,000 acres.



Farm drainage: 752,600 acres.



Terracing: 99,480 miles.



Irrigation land preparation: 135,850 acres.

legislation has now been enacted in all States and Puerto Rico, as well as the Virgin Islands, Hawaii, and Alaska. Local people quickly recognized the democratic process of self-government in the districts—with farmer control and farmer decisions “at the grass roots.” By the end of 1937, 22 States had passed legislation providing for the organization of districts. The first was the Brown Creek District in North Carolina, set up on August 4, 1937. In the first year 13 districts comprising 8,000,000 acres were organized. Since then interest in districts has continued to grow. Nearly three-fourths of the Nation’s farms are now included.

Growth of districts, by calendar years, to December 31, 1946, is shown in the following summary:

Calendar years	Districts organized		Total area in districts		Farms and ranches, ¹ cumulative total
	Annually	Cumulative	New districts and additions	Cumulative total	
	<i>Number</i>	<i>Number</i>	<i>Acres</i>	<i>Acres</i>	<i>Number</i>
1937-----	13	13	8,002,022	8,002,022	-----
1938-----	96	109	51,037,951	59,039,973	-----
1939-----	108	217	60,450,905	119,490,878	-----
1940-----	212	429	147,584,445	267,075,323	-----
1941-----	224	653	115,553,677	382,629,000	1,908,045
1942-----	173	826	96,500,000	479,129,000	2,197,983
1943-----	177	1,003	86,750,000	565,879,000	2,522,636
1944-----	218	1,221	109,298,084	675,177,084	3,109,536
1945-----	240	1,461	126,539,434	801,716,518	3,622,557
1946-----	294	1,755	143,216,060	944,932,578	4,183,677

¹ Based on the 1940 census of agriculture, with some local variations for districts in parts of counties, or on a watershed basis.

NOTE.—Totals at the end of each year are net, including corrections and adjustments made during the year.

The peak in organization for 1 year was reached in 1946, when 294 new districts were organized. The 294 districts comprise over 128,000,000 acres. Additions that year to 118 previously-organized districts totaled 15,000,000 more acres, making 143,216,060 acres altogether brought into districts in 1 year. Organization continues at a rate of about 20 new districts a month. This increase is expected to decline, however, as the area not in districts becomes smaller.

As of June 1, 1947, there were 1,873 conservation districts organized in the United States and Puerto Rico. They encompassed 993,000,000 acres, of which 650,000,000 acres were in farms. Districts now embrace about 65 percent of the total farm and ranch land. They include 73 percent of all the farms in this country. **THERE ARE NOW OVER ONE BILLION ACRES IN ORGANIZED SOIL CONSERVATION DISTRICTS.**

Local farmers manage district affairs. Each State also has a committee, board, or commission which is responsible, as an agency of the State, for the final determinations on district creation, and for guidance to the local districts after they are organized. The districts have their own governing bodies, selected from local leaders. At present there are over 9,000 voluntary unpaid members of district governing bodies. In addition, many neighborhood leaders give unselfishly of their time to help carry on soil and water conservation work.

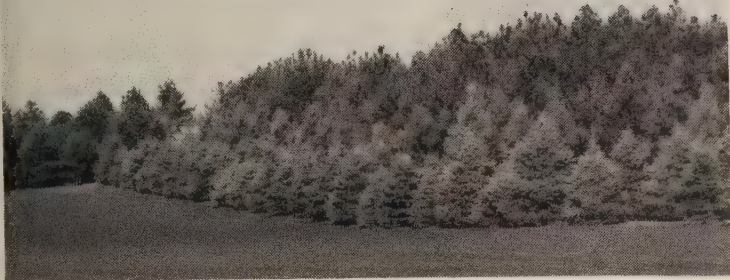
On request of district governing bodies, the Department of Agriculture enters into memoranda of understanding with districts. These permit the agencies of the Department to make assistance available to districts. The Soil Conservation Service, for example, provides technical assistance for conservation planning and treatments, equipment for loan or grant, and limited materials and supplies, as available. Such assistance is needed by some 4,430,000 farmers and ranchers in organized districts.

CONSERVATION PLANNING AND TREATMENT

CONSERVATION plans for entire farms or ranches are cooperatively made and carried out by technicians of the Soil Conservation Service, working with the farmers in the districts through their agreement with the district. The farmers pay the cost. Every acre is treated according to its capability and its needs. It usually takes several years to adjust land use on a farm to the capabilities of the land and to apply all of the necessary conservation treatments. Some practices are applied each year until the plan is fully completed in accordance with the farmers’ wishes and financial ability.

In 1946 Soil Conservation Service technicians assisted farmers in preparation of over 127,000 new conservation plans. These plans were for more than 33,500,000 acres, 63 percent higher than the previous year. **THIS BROUGHT THE NUMBER OF ACTIVE PLANS, IN DISTRICTS ALONE, TO 424,372, COMPRISING 116,646,256 ACRES. COMPLETE TREATMENT WAS PUT ON 19,300,000 ACRES BY FARMERS IN 1946, WITH SERVICE ASSISTANCE.** This is what the Soil Conservation Service helped districts do.

This new treatment of land for conservation was carried out as a part of individual farm plans.



Windbreak planting of this sort was accomplished amounting to 6,940 acres in 1946.

In all, 57,000,000 acres in conservation districts have thus been treated as planned. Looking ahead, by 1950 at least 150,000,000 acres are expected to have received proper treatment. In addition, large areas will have been benefited by group-enterprise jobs. Responsibility of districts to farmers for guidance in reapplication and maintenance of practices becomes larger as initial treatments are finished.

Photographs of some soil and water conservation practices, showing amounts finished in 1946, are shown on pages 36 and 37. Quantities of such practices applied in 1946 were 78 percent above 1945.

Some conservation practices finished in soil conservation districts to January 1947 with Soil Conservation Service assistance are as follows:

Name of practices	Cumulative to December 31, 1946	Unit
Contour cultivation.....	11, 076, 649	Acres.
Cover crops.....	4, 285, 478	Do.
Stubble mulch farming.....	12, 912, 965	Do.
Strip cropping.....	3, 017, 038	Do.
Seeding range and pasture.....	4, 800, 671	Do.
Number of farm and ranch ponds.....	65, 769	Do.
Tree planting.....	258, 451	Do.
Woodland improvement.....	4, 017, 214	Do.
Terracing.....	386, 024	Miles.
Diversion channels.....	9, 806	Do.
Farm drainage.....	1, 362, 436	Acres.
Irrigation: Land preparation.....	276, 557	Do.
Improved water application.....	873, 039	Do.
Windbreak planting.....	34, 512	Do.

GROUP CONSERVATION JOBS

Group-enterprise work involving two or more adjoining landowners is also a vital part of the soil conservation district's job. Such work consists of drainage, irrigation, flood control, and special erosion control jobs. This kind of activity has been progressing about 3 years. Jobs planned

to the end of 1946 were to benefit 3,625,000 acres at an installation cost of about \$13,000,000.

So far 1,486 group jobs have been completed, to the benefit of more than 1,760,000 acres. Included among the finished practices are the clearing of 2,614 acres; the construction of 1,662 miles of ditches, canals and laterals; with nearly 17,000,000 cubic yards of excavation; the leveling of 7,290,000 cubic yards of spoil bank; the construction of 1,809 small structures; the laying of 401,270 linear feet of tile drain; and the laying of 62,154 feet of irrigation pipe.



Improved water application totaled 380,660 acres for the one year of 1946.

Usually group enterprises are organized for specific purposes, and involve two or more landowners who work together in construction, operation and maintenance. Enterprises effecting several farms may overlap areas covered by individual conservation plans. Such work is often necessary before a complete job can be done on any one farm.

COOPERATIVE ACTION

Farmers, bankers, and rural organizations have long sought coordination of public assistance to farmers. They now recognize the advantages of coordinated action through the district governing body in local communities. Local district programs and work plans afford an opportunity to bring public assistance to bear for the improvement, conservation, and maintenance of agricultural lands.

Today rural people are cooperating to protect their land against erosion and misuse. They are working as individuals, and in neighborhood groups, to carry out their districts' programs.



Cooperative action for proper land use.

Such cooperation among local people, and the coordination of county, State, and Federal assistance, has proved highly effective. It is generally recognized as the most economical and effective way of getting soil and water conservation jobs accomplished.

STEWARDSHIP OF PUBLIC FUNDS

Several agencies of the Department of Agriculture work in the soil and water conservation field. Briefly some phases of the agencies' responsibilities are as follows: The Soil Conservation Service has the responsibility of providing technical and other assistance to districts. The Agricultural Conservation Programs Branch (PMA) makes payments to owners and operators for participation in the conservation program. The Farmers' Home Administration (formerly FSA) makes loans to promote conservation on tenant purchase farms, and to develop facilities for water storage and utilization. The Forest Service does conservation work on private and public lands, particularly National forests. Both the Soil Conservation Service and Forest Service make surveys and carry on works of improvement in aid of flood control. In the fiscal year 1947, appropriations to the SCS are estimated as about 12 percent of the conservation funds appropriated to the Department for use on private and public lands.

State extension services and the Federal Extension Service carry on educational work in conservation, and many other activities relating to agriculture. Many of them have worked closely with rural people in the creation of soil conservation districts.

State legislatures of 43 States have made appropriations for district work. Over \$2,000,000 of State funds were available for the biennium 1945-47. Several of the States are increasing their appropriations or allocations.

Careful stewardship of funds enables the Soil Conservation Service to get effective conservation on the land at the least expense. By cooperation with districts, the total SCS costs for complete conservation planning and treatment are \$1.50 per acre. This includes expenses for total operations, research, and administration. It covers technical services out in the fields with farmers, and some tree planting stock, as well as certain equipment not commonly available to farmers. **NO CASH PAYMENTS OF ANY KIND ARE MADE TO FARMERS OR RANCHERS BY THE SOIL CONSERVATION SERVICE.**

Owners and operators are willing to use their funds and facilities to pay their own soil conservation treatment costs. More liberal loans and credits are being made available to them. They do not expect payments in cash for the repeated practices year after year; but they do know that they can rely on additional income from conservation. They look to the districts for technical on-site assistance, guidance, and other help not otherwise available. Experience proves that this is the way to get the conservation job done, and done right, at the least public expense to the taxpayer.

CONSERVATION BENEFITS

Applied conservation pays in terms of added farm income. It helps to increase the margin between operating cost and profit. It brings about higher yields per acre. It makes possible equal or more production on less acreage. It insures a sound productive agriculture.

The benefits of soil and water conservation are becoming more and more evident. Conservation farming is spreading to neighboring farms every day. It has been proved that poor land can be improved, and good land made better, by conservation.

In 1946 the Soil Conservation Service ascertained from farmers in 25 States the effects of conservation on income. On 984 farms, with 83 percent of the needed conservation practices done, the average gross income was \$7,332; whereas 888 similar farms with only 47 percent of the work completed averaged \$5,959. The difference in income per farm for the crop year 1945 was \$1,373.

On the high-score conservation farms the average gross income was \$28.30 per acre. The farms with less conservation averaged \$23.40 per acre. This \$4.90 additional income for each acre was obtained with one-third more conservation.

OUTLOOK

The 1945 Census of Agriculture shows approximately 1,142,000,000 acres in farms and ranches in continental United States. There are about 6,000,000 farms and ranches. When all of these are considered, it is clear that the conservation job is not going fast enough yet. If further irreparable damage is to be prevented the soil and water conservation job must be speeded up.

To get and keep effective conservation on all cropland, pasture, range, and woodland, the conservation know-how must become firmly fixed in the minds of those who operate such land. Conservation education has gone a long way toward getting people to recognize erosion problems. It has introduced owners and operators to many better conservation farming methods. But this alone is not enough. Continued conservation educational activities and technical assistance out on the land will be necessary.

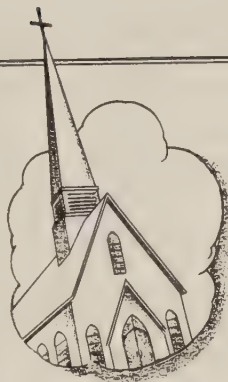
Devastation of land even now proceeds at a rapid rate. In some places measures must be taken immediately. In other areas it is possible although not advisable to postpone conservation work for 10 to 20 years. The remaining 460,000,000 acres of our good land must be protected before it is too late. This job can be done on time, by the farmers and ranchers themselves, with intelligent hard-driving teamwork between soil conservation districts and the assisting Federal technicians.

Real and lasting progress has been made in the last decade. The advancement in the next 5 years can far exceed the accomplishments already obtained.

Farmers who are planning to buy life insurance will find the 50-page booklet, "Life Insurance for Farm Families," recently published by the Bureau of Agricultural Economics, a useful handbook.

The section, "Planning an Insurance Program," will be of particular interest to those buying insurance for the first time. Suggestions are given as to how a farmer can select an insurance policy that will fit his needs and his pocketbook.

"Life Insurance for Farm Families" may be obtained from the Superintendent of Documents, Washington, D. C., for 15 cents.



RESOLUTION

ADOPTED BY THE ILLINOIS SYNOD OF THE UNITED LUTHERAN CHURCH OF AMERICA

Whereas the church is in a position of leadership in the community, and leads toward a richer, more abundant life, and

Whereas the basic wealth of any nation is in its topsoil and,

Whereas the conservation of soil and moisture and the maintenance and improvement of fertility is the most important agricultural problem existing today, and

Whereas the conservation of souls and the conservation of soil are inseparable, what is good for the land being good for man, and

Whereas where topsoil is eroded away and fertility is lost, people are usually poor and churches are dilapidated, and

Whereas people living on land properly taken care of are usually more healthy physically, mentally and morally, and

Whereas the church in its position of community leadership can be instrumental in informing people of the seriousness of the problem of soil, water and fertility loss, and also of remedial measures by developing a comprehensive program of conservation, by having sermons on land misuse and soil conservation, by Sunday School lessons, and by groups and individual discussions, and

Whereas an informed public is an essential step toward the establishment of soil conservation on the land, and

Whereas conservation organizations such as the United States Soil Conservation Service, Soil Conservation Districts, the Extension Service, the State Conservation Department, Friends of the Land, and other conservation organizations are willing to assist by providing literature, films, and other information to assist the church with its program.

Be it therefore resolved that the Illinois Synod of the United Lutheran Church of America include soil conservation in its church program, urging that pastors become better informed so that they may influence the possessors and tillers of land to be better stewards of the soil, and to encourage the wise use of land for ourselves and for those who follow.



A Hope for the Future

By Walter C. Lowdermilk

IT HAS BEEN given me to study the use of land in 26 countries, and in the cradles of civilization in the Far East and in the Near East. What do we find? Where man has lived the longest in organized societies, there the land is in the worst condition. What does this mean? It means that civilization is not yet a success. It means that mankind has not yet worked out a lasting adjustment to the land—a righteous adjustment to the good earth. For it is in the primeval lands of the new world that people today are enjoying the greatest abundance. As old lands were farmed out, wasted or depleted, and damaged, chiefly by soil erosion, peoples moved out to newer lands time after time. The saying “Westward the course of Empire took its way” only hides the tragic fact that man has wasted the land and has left it, worked out and washed away, for new lands to the west.

But today there are no more continents to discover, to explore and colonize, and to exploit. Mankind has now occupied all the lands of the earth, and taken them into possession. To be sure, all are neither equally stocked with people nor fully made use of. But as the public domain of the United States is closed for further homesteading, so the lands of the world are no longer open to settlement. No more free land exists. The frontier of new lands with only minor exceptions is gone and gone forever. In its place, however, is a new frontier that lies in the conservation of lands now under use. And here we have a challenge as great as the challenge of war for national defense, if we have the eyes to see what is at stake.

IN MY STUDIES of land use in old countries, I had to devise a simple method of field work to cover large areas in a short time. I had excellent cooperation of agricultural scientists of other countries. With their help I made use of the following method: We sought out fields that had been cultivated for a thousand years or more.

NOTE.—This article was developed from a paper presented by the Assistant Chief of the Soil Conservation Service at the last annual meeting of State Association of Soil Conservation District Supervisors in Huron, S. Dak.

And then I studied this field and that field to learn how it could have been farmed for a thousand years. If a field had been farmed for a thousand years, the prospects were that it could be farmed for another thousand years with equal care. For practical purposes, here was a measure of permanent agriculture. This evening I offer this same method to you to apply to your own farms.

May I suggest that tomorrow you lay across your fields this measuring stick of use for a thousand years? Will your present methods of farming let your field be cultivated and keep up good yields for a thousand years? This is a measure that you yourselves can apply to each of your fields on your farms.

BESIDES hunting for fields that had been cultivated a thousand years, I sought to find out why other areas of yet greater extent had been abandoned by farmers, and why agriculture had failed. In all cases the land told its own story. The record was deeply written in the land. For the most part, soil erosion had damaged and destroyed such lands—erosion and gullying on slopes and overwash and sedimentation in valleys and on alluvial plains. In some cases, soils had been washed off to bedrock over vast areas, and in their midst stood ruins of villages and towns where happy people had once lived from the bounty of these lands. Now it would not be possible to repeople these villages and towns because the soil is gone. Ruins of the land are more tragic and doleful than ruins of villages. For, if the land had not been destroyed, it would still be possible to rebuild the villages and towns and to grow food and to repeople them. But this is no longer possible.

Today we are prone to measure the fate of land solely in economic terms of present market prices. If it does not pay under present economic give and take, we look upon destruction of land with complacency. This complacency grows out of a false assumption that there is an abundance of land; that if we destroy this farm, we can go west to take up new land. But in the long history of mankind, economics is like the weather—it changes back and forth. It changes far more rapidly than climate

changes. But the changes in land that are brought on by soil erosion are not like economic changes. They are cumulative in their destruction and in the effects of eroded materials. Such changes are not reversible. It matters little what the economics were that brought on soil depletion and destruction if the land is destroyed for further growing of crops. The fact is that when soil is gone it is costly beyond reason to restore the remaining material to a state of production. Commercial economics may actually set in motion processes that cannot be reversed—may impoverish the land. Herein is an insidious hazard to our land. For under profitable business economics the land of a nation may be despoiled.

IN OUR STEWARDSHIP of land, therefore, we must look beyond commerce of today to the economics that determine the future of our people. If economics will justify nothing else than the destruction of land which is the heritage of our people, something is wrong with the economics rather than with the land. In fact, a resource may not be economically ripe for use at the present time. It should be a principle that a resource is economically ripe when its use will support its own conservation. Here we have a measuring stick to determine when resources are ready for utilization, when the law of supply and demand may be let do its good work.

This is not an academic question. It is tremendously real right now. Let us examine this matter a little further in the light of world events today. We have just gone through a tremendous effort in carrying on the World War. It has cost us enormously in human lives, in manpower, in products from our land, in oil, in mineral resources, most of which have been lost forever to any further use. The burden upon the nation must be carried as a public debt for several generations before it will be paid back, if ever. And the prospects are not too good that this is the last war.

OUR SOCIAL STRUCTURE is built on the land and out of the products of the land. The cost of World War II, therefore, may be charged against the land of the Nation. If you had asked me 10 years ago if we as a Nation could undertake an enterprise that would mean a charge of \$175 against every acre of the 2 billion acres in the 48 States, or \$875 against every cultivated acre of 400 million acres of our farmed fields, I should have said, "Impossible." For that would be many

times the appraised value of our land. But we have done just this very thing in carrying on World War II, and the end of the cost is not yet in sight. What sort of economics is this, that will encumber the Nation beyond the appraised value of its farms and ranges, forests, and industries? It becomes apparent that we do what it takes to safeguard our liberty of action. We can do no less to safeguard the land base of the country which must support the entire Nation.

FOR SOME TIME I have been studying the problems of population, food, and land, as they affect our future in relation to the rest of the world. Here is what I find.

The population of the world has been growing at a rapid rate for the past 300 years. According to authorities on population, there were 545 millions of people on the earth in 1650; in 1800, 906 million; in 1900, 1,608 million, and in 1940, 2,171 million souls encumbering this earth. And there is no sign of a decline in this rate of increase. If this same rate of increase in human population for the past 300 years should continue for another 300 years, the population of the world would total 21 billions of souls, unless food should fail or people kill themselves in wars and automobile accidents. There is no one I know who believes that the lands of the world could feed so large a human population as 21 billion.

What then is going to stop this increase in human population? Hungry people do not keep treaties. Nor do they stay within their own boundaries. We can see in this trend of things causes of future wars.

Now let us look at the food situation. In 1944, the Food and Agriculture Organization of the United Nations made a study of the food situation throughout the world. The findings are startling. More than half the population of the world is, at the present time, undernourished, having less, on the average, than 2,250 calories per capita per day. A third of the population enjoys between 2,250 and 2,750 calories per capita on the average. And less than 10 percent have over 3,000 calories on the average per person. We in the United States enjoy fully 3,250 calories of food per person on the average. Thus, the food situation of the world is not now satisfactory. It calls for greater production in quantity as well as in quality of foods to bring adequate nutrition to the present population of the world.

It is to our interest to help other peoples help themselves, and to help them produce products that we will accept in exchange for such materials and services that will help them help themselves.

The task of producing food enough and of the right kind, then, is one of the major proportions in view of the rapid increase of population now taking place throughout the world.

What is the area of farm lands which must feed this world population? What is the possibility of increasing this area, and what are the possibilities of improving production on the lands under cultivation? These are questions of highest importance to peace among nations and to stability in world economy.

ACCORDING to the best information available—at the present time, there are being cultivated now about 3.7 billion acres of land throughout the world. According to the same sources of information, it is possible to increase this area to about 4 billion acres, or about 8 percent of the world's entire land area. It is a startling fact that farm lands of the earth are so limited in the face of this phenomenal increase in population and its enlarging demands. Yet the best lands of the world are now under use. Comparatively small areas may be reclaimed by drainage and by irrigation. Low-cost projects have already been carried out in much of the world. Projects of the future will be more costly. The outstanding fact in this study, however, indicates that greater increases in production will come as increased yields from lands already under cultivation than from increases in area, important though these may be.

In view of the vast areas of land that have been damaged, depleted, and destroyed for further farming, we begin to sense how real is the crisis in land use round the world and to realize the necessity of its conservation with use if we are to build a world safe from war.

WHAT can be done in the face of these three tremendously sobering facts? Civilization is running a race with famine. Which will win? This is not an idle question.

If famine wins, wars and rumors of war will be our lot in the future. But if civilization wins, there is hope of peace with security for mankind. The issue at stake is tremendous. But how can we win this race with hunger and famine?

The challenge for increase of food and fats and fibers enough is plain to see. It calls for the application of science in improved crops, in safe-

guarding crops from insect damage and plant diseases, in fertilization of the soil to replenish plant nutrients extracted in the harvest, in the conservation of physical body of the resource of soil, in the conservation of the rain that falls upon it or the waters that are spread upon it, and in full use of all kinds of land with conservation of the soil. These and similar objectives are plain to see. In other words, the technological aspects of using lands to full capacity with conservation is becoming more and more apparent. Much is yet to be learned in this field both from the long experience of farmers of the old world as well as from the experimental studies and practical demonstrations and work of our conservation movement here in the United States. We know enough now that if the measures already tested on a wide scale could be applied to the lands of the world, there would be a tremendous increase in production. And, of still greater importance, the resulting conservation of the soil and moisture resources of the lands throughout the world would insure continuing production for future generations. But how can these measures be carried out on a vast enough scale? We face here a problem even greater than the technical problems. An answer to this question involves an enlistment of the farmers of the world in so great a task. And how may this be done?

FULLY 70 to 75 percent of the peoples of the world are farmers. They are individualists, they are self-reliant, they are industrious, intelligent, practical, and reverent. These are the qualities that have made for the survival of peoples, and are the hope of the future. But these qualities of individualism and self-reliance do not favor organization of farmers in closely controlled groups. It is much more difficult to speed up efficiency in farming than it is in industry. It is more difficult because of the great diversity of lands from field to field, farm to farm, and drainage to drainage. Besides, farmers must deal with the soil, with plants and animal life, with the elements—with the rain and the wind—the weather as well as variable market conditions.

LET us take a look at what we are doing in soil conservation districts. What is the significance of this enterprise that has swept the country like a grass fire on the prairies of the Dakotas? These districts have set three things going at the same time—three important things. For they em-

(Continued on next page)



Huge quantities of soil were ripped off field beyond fence and dumped in the ditch along Highway 10, in windstorm of May 1, 1947.

DIFFERENT FIELDS, SAME WIND!—High wind blew across north central Iowa on May 1, 1947. Many tons of topsoil were lost from the nearly level highly productive fields.

In figure 1 we see some of the soil accumulated in the roadside ditch along the north side of Iowa Highway No. 10 about 4 miles east of Clarion, county seat of Wright County. This material was mostly sand. It sifted through one's fingers. The finer particles—silt and clay—had been dispersed over many square miles of countryside farther south. Just across the fence, to the right, the field from which most of the deposit had been blown was being disked in preparation for corn planting. The tractor operator told me that it had been seeded to oats with sweetclover and redclover in 1945. It had been plowed in August 1946. Therefore, the land had lain bare of vegetation and unprotected for over 8 months!

The common practice in this part of the State of Iowa is not to seed a field to grass oftener than once in 6 or 7 years. Organic matter has been depleted, as evidenced by the sandy material left in the ditch. In a well-aggregated soil these particles would have bound in place.

(Continued from preceding page)

body the formula of self-government as set forth by Abraham Lincoln when he said that a Government of the people, by the people, and for the people should not perish from the earth.

First, it is of the people; it gives play to individual initiative. The individual initiative of our people is without question our greatest resource.

Soil conservation districts also provide for the second factor in this formula—"by the people," as it is worked out in approval by the majority.

We find that soil conservation districts also provide for the third part of our formula: namely, "for the people."

This means that conservation contains certain objectives for common security and welfare. The land is the Lord's. The land in a larger sense is the basic resource and heritage of the whole people. We may own it in fee simple in our lifetime, but by paying taxes we admit our steward-



No fall plowing here; no soil blown from field beyond fence at right. A bit of the cornstalks residue was whisked up from the newly seeded oats field.

In figure 2 we see a field one-fourth mile west of the other one. This had been seeded to oats a few weeks earlier. Preparation of the land was by diskings down cornstalks. Here a considerable amount of residue has been lost from the field but there is no evidence of soil having been stolen. On similar soils—Clarion and Webster series—at the agricultural engineering research farm near Ames we found in 1946 that corn yields were reduced only 1.6 bushels per acre when diskings, which mixes the residue of the previous crop into the top layer of the soil, was the sole preparation for corn planting. The average yield was 72.4 when the land was plowed, 70.8 when disked. Using plowing as 100 percent in both cases the comparative time and horsepower-hour requirements for diskings were 83 percent and 67 percent, respectively.

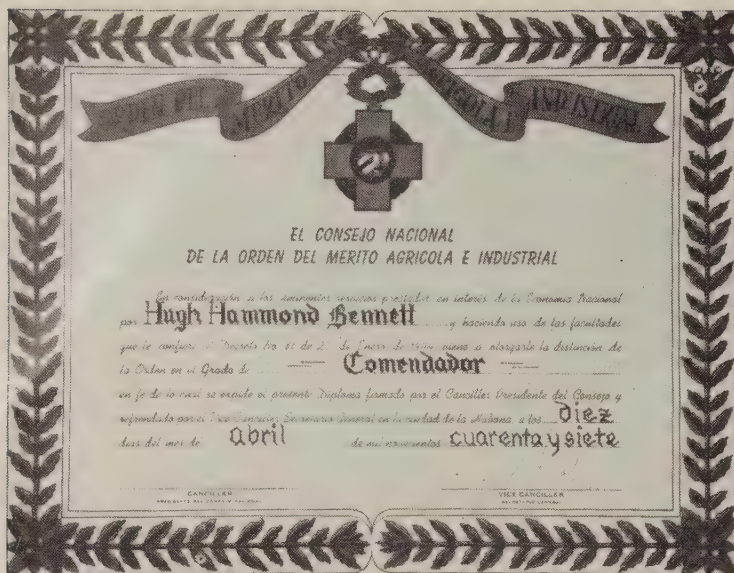
If the early fall plowing dates generally practiced in north central Iowa indicate a belief among farmers that they cannot get their plowing done in the spring or late in the fall, diskings saving of time and horsepower hours should appeal to them. This is especially true when they also can minimize the blowing of their soil.

R. A. NORTON.

ship of it. The land is the source of the food supply for all the people.

The greatest prospect for safeguarding our lands rests in the procedure that stimulates the growth of a conservation movement out of the soil, so to speak, out of the fields, out of the pastures and woodlands, out of the farms, and in the hands of farmers of the Nation.

What then is the promise of this movement of soil conservation districts for the world? Fully 70 percent of all the people of the world are farmers, or more than 1½ billion souls. These are farming about 3.7 billion acres of land. When this vast population makes use of a mechanism such as the soil conservation district, we shall have the best promise of growing food enough for the people, nation by nation, and for the people of the world as a whole. There is no hope for peace on earth or good will among men until the farmers of the world grow food enough for the world's population.



CUBAN HONORS FOR BENNETT.—A gold medal and the Cuban Order of Merit have come to Hugh Bennett, Chief of the Soil Conservation Service, in recognition of extraordinary services to the government and people of the Island Republic two decades ago. The award, made through the National Agricultural and Industrial Society, confers the rank of *Comendador* (Knight Commander) in the society. It sets forth Bennett's "eminent services lent in the interest of the national economy" when he was leader of a cooperative project between the Tropical Plant Research Foundation of Cuba, the Cuba Sugar Club, and the United States Department of Agriculture.

Bennett's survey is recorded in the book, "Soils of Cuba," one of the most significant studies ever made of so large an area.¹ This survey became the heart of Cuba's modern agricultural program—the physical basis of its revitalized sugar-cane industry. It called for extensive readjustments

of land use to fit land capabilities on more than a quarter million acres, on most of the huge centrals (sugar plantations).

When the survey was started, the nation's basic crop, sugarcane, was suffering severely in many localities from mosaic disease. The principal cane varieties of the world were rapidly tested throughout the Republic, following the determination and mapping of the best types of sugarcane land. Within a comparatively short time satisfactory adjustments of variety to land were effected. Production problems almost immediately improved.

For example, the wonderful mosaic-resistant, high sucrose varieties of sugarcane, POJ 2878 and 2883, from Java, proved peculiarly well adapted to the red Matanzas soils and to the black Camaguey soils; and the drought-resistant variety POJ 2727 fitted the dry Jobabo soils. These and other varieties were tested on nearly 80 centrals. This new scientific method of finding the right varieties of canes and the proper place to grow them quickly brought sugarcane production into proper adjust-



ment with the land. This had a great deal to do with the nation's economy and the Island's huge output of sugar so acutely needed during World War II.

¹ The report of the Commission on Cuban Affairs ("Problems of The New Cuba," published by the Foreign Policy Association Inc., 1935) says of "The Soils of Cuba." "Our discussion of Cuban soils has been based on this invaluable study."

GREEN MOUNTAIN DISTRICT

(Continued from page 34)

John, manager of the cooperative, has found a market for treated lodgepole pine poles and obtained a trial order for tamarack poles.

With the farmers able to devote their time to their farms and improved methods, clearing is progressing more rapidly. Only 9,000 acres had been cleared in the three decades or more before the district was organized. (Of this, 2,000 acres should have been left untouched.) Thus, 13 percent of the investment in land clearing during that period offers little return, but these fields are reminders of the need for knowing what land is good for.

The total cleared during the first 4 years of district operations was nearly 1,300 acres. Nearly 1,000 acres of this was complete during the last 2 years. All is land suitable for crops and all is ready for regular farming operations. Other hundreds of acres are in the process of clearing.

Development of the farm units does not stop at clearing, however. It continues through the processes of improving the fertility of the soil, making the best use of available irrigation water, development and management of woodlands, and prevention of erosion.

Improvement of the parts of farms to remain in timber has hardly gotten under way, except in a few cases. It has been necessary for most farmers to concentrate on the clearing and preparation of their croplands. Nevertheless, the experiences are convincing them of their woodlands' value. In 1941, they asked people to come out and cut all the wood they needed. Today they get stumpage for their trees and many are inclined to wait until they are ready to clear before they sell.

The supervisors are teaching them that the trees on the land not to be cleared are a worthwhile crop to supplement their cultivated crops. They are learning, too, the advantages of managing those trees so that they will yield the best sustained income.

REVIEWS

THE LAND AND WILDLIFE. By EDWARD H. GRAHAM.
 OXFORD UNIVERSITY PRESS. NEW YORK. 1947. BIBLIO.
 INDEX. 32 HALFTONE PLATES. PRICE \$4.00.

The thesis of Dr. Graham's earlier book, "Natural Principles of Land Use," (1944) was that land managers must depend upon ecology. That of the present book is that wildlife managers must depend upon land. While giving due credit to such artificial measures as flushing bars, clearings, refuges, game farms, predator control, winter feeding, protective laws, etc., the author considers their importance secondary to the importance of maintaining the wildlife factory: the land and its waters.

With this, few modern wildlife managers or administrators would disagree—openly, at any rate. His "lead" from there, however, is another matter. It is that land management in the interest of wildlife is the same type of management that is needed to produce the other goods of the land, while safeguarding the land itself (the last phrase representing the all-important bug under the chip). Few wildlife agencies have progressed so far in their thinking, still fewer in their action programs; and no one claims that "original" numbers can be restored by this or any other means in an agricultural-industrial civilization. Yet, if we want as large a wildlife-byproduct as our land will yield, there is little doubt that the broad basic policy which he advocates is the only sound one.

The perennial \$64 question is: Who is going to do it? Wildlife agencies by themselves cannot. Land operators, as a whole, will not unless they see tangible benefits; yet only they can do it on the privately owned lands of the Nation. If wildlife were to become a cash crop, they might be interested; but there arise the questions of feasibility and effects upon the American tradition of a free outdoors. If they can see (a) that wildlife benefits them in other ways and (b) that wildlife is benefited by the very measures which they would undertake in support of their land, their cooperation might be enlisted.

In the opinion of the reviewer—and apparently of Dr. Graham also—only the argument based upon total land-value holds permanent promise. Biologists have long known that plants and animals, wild or tame, are governed by the same biological principles. The greatest single idea in modern wildlife management, now coming to the fore and well supported by this book, is that wild and tame species alike respond to the same measures of land improvement. Dr. Graham has become one of the foremost apostles of this idea.

Turning to the organization of the book itself: The first chapter makes delightful reading but does little to support the author's thesis. To the reviewer, it seems like straining a point to depict our wildlife heritage in terms

of prehistoric animals, domestication, modern symbolism, and the naming of constellations or baseball teams.

From there on, the discourse moves smoothly, though occasionally interrupted by too-lengthy descriptions of methods without their settings. The author describes the kinds of land on which wildlife can and should be encouraged, what the prospects are, and how wildlife there is likely to affect human interests. He calls needed attention to the importance of the seral stage in wildlife production, the fact that by our use of land we have in effect created most of our vertebrate pests (not to mention shortages), the long-term futility of gadgets and stop-gaps, and the as-yet-unorganized means of accomplishment, and many other points too often overlooked by the program-makers. Time and again, he returns to the central idea: that what is good, in the long run, for other land values is good also for wildlife; and its corollary: that a rich and varied biota is a good thing for the land.

The reviewer found the last three chapters (12-14) the most challenging, and he suggests that they be read *before* chapters 3-11, on the theory that it is better to set the stage before putting the actors through their paces, as the middle nine chapters do. Doing this might deprive the book of an excellent climax, though.

Dr. Graham's style in this book, as in his earlier publications, makes for simple, direct, and convincing reading throughout. One could wish that such a style were more common in American writings on this and related subjects. Apart from its immediate practical utility, which is very great, one of the principal contributions of "The Land and Wildlife" should be to encourage an optimistic viewpoint, which all of us would like to hold but which has been excluded from the minds of many by the apparent existence of irreconcilable conflicts.

The list of 150 references contains the author's well-known and useful annotations. Conspicuous by its absence is a paper that was at least one of the parents of this whole concept: Aldo Leopold's "A Biotic View of Land" (1939).

Dr. Graham's new book is a "must" for students and professionals in the biotic management of land.

—RUDOLF BENNITT



"Special mention should be made of one merchant in particular, O. E. Breazelle, who is going to have printed on his wrapping paper used in his market, how to develop a good pasture. On the other wrapping paper used in his store, he plans to advertise what the farmer needs in the way of cover crops, putting stress on all soil conservation practices."—From the annual report of the Stone County Soil Conservation District, Miss.



of the huge gullies in Southeast Alabama—gullies he didn't know were there until he saw them from the sky.

When Malone was president of the Alabama Bankers Association in 1944, the association in cooperation with the farmer-supervisors of the Wiregrass Soil Conservation District, sponsored a farmers' meeting in Houston County and awarded certificates of merit to seven farmers who had done outstanding soil conservation jobs on their lands. In 1945, when similar certificates were awarded following a field tour, Malone's First National Bank of Dothan was host at a barbecue supper. For two successive years, this bank put out calendars encouraging soil conservation. At present plans are under way to install a large clock in front of the bank. On both sides of the clock will be inscribed "IF WE LOSE THE SOIL WE LOSE ALL."

—LEROY HORN.

SIGN OF THE TIMES.—I was trying to get an early start one morning not long ago. I went to the garage to get my pickup and started out South St. Andrews Street here in Dothan, Ala. I was going to a farmer's place near Hodgesville to help him work out a soil conservation plan for his farm.

I noticed a newly painted seat had been placed at the bus stop. The day before I had seen a few new seats at other bus stops advertising business houses in Dothan—but this was different. I backed up the car and read the three words, "SAVE THE SOIL". As a technician for the Soil Conservation Service and keenly alert to things of this sort, I went over for closer inspection. On the back of the seat were the initials of the Junior Chamber of Commerce.

At the shop that made the benches and painted them I learned that Wallace D. Malone, president of the First National Bank of Dothan, was responsible. I should have known, of course, for Wallace Malone, member of the State legislature representing Houston County, is a charter member of that ever-growing group of citizens concerned about conserving the country's soils.

The Dothan bank president has served as chairman of the agricultural committee of the Alabama Bankers Association and as the association's president. He first became interested in soil conservation when A. A. Shepard, then a Soil Conservation Service technician at the old CCC Camp at Dothan, took him to what he found to be one of the best farms in Southeast Alabama and showed him what was taking place. Pretty soon after that, Malone was riding in a airplane and saw some

NOTE FROM A DISTINGUISHED TRAVELER

ALEXANDER KIRK

Post Office Box One, Florissant, Colorado

MAY 15, 1947.

DEAR MR. BENNETT: I am taking the liberty of expressing to you my sincere appreciation of the superior quality of assistance which has been afforded me by the members of your Service operating in Teller County, Colo.

Since my retirement last year as Ambassador to Italy I have acquired and settled in a small ranch in this neighborhood and have found that the same short-sightedness with which for thirty years I have contended in the field of international relations is manifest here in the matter of soil depletion and erosion. The whole-hearted, effective and altruistic advice and cooperation which have been afforded me by your personnel in this area have been not only of the greatest assistance but a real inspiration and I wish to congratulate you on the contribution which you are making to the basic problem of our national life.

Yours very truly,

(S) A. C. KIRK,

(U. S. Ambassador, retired.)

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WELLINGTON BRINK

Editor

Art Work by

W. HOWARD MARTIN

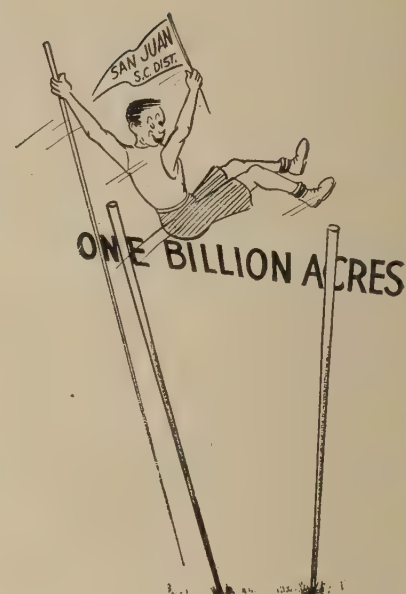
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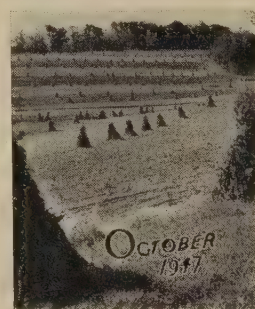
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BILLION-ACRE DAY.—On June 9, 1947, the acreage in soil conservation districts, and other districts assisted by the Soil Conservation Service, passed the billion-acre mark.

Five new districts were organized and some area was added to one old district. The total new area for the day was 2,770,000 acres in the following districts: Lower Yakima Valley, West Benton, and Cle Elum, all in State of Washington; San Juan in Colorado, and an addition to Horse-Rush Creek in the same State; and Fulton County, N. Y. *The San Juan Soil Conservation District in Colorado put the cumulative area in districts over the 10-digit mark.*

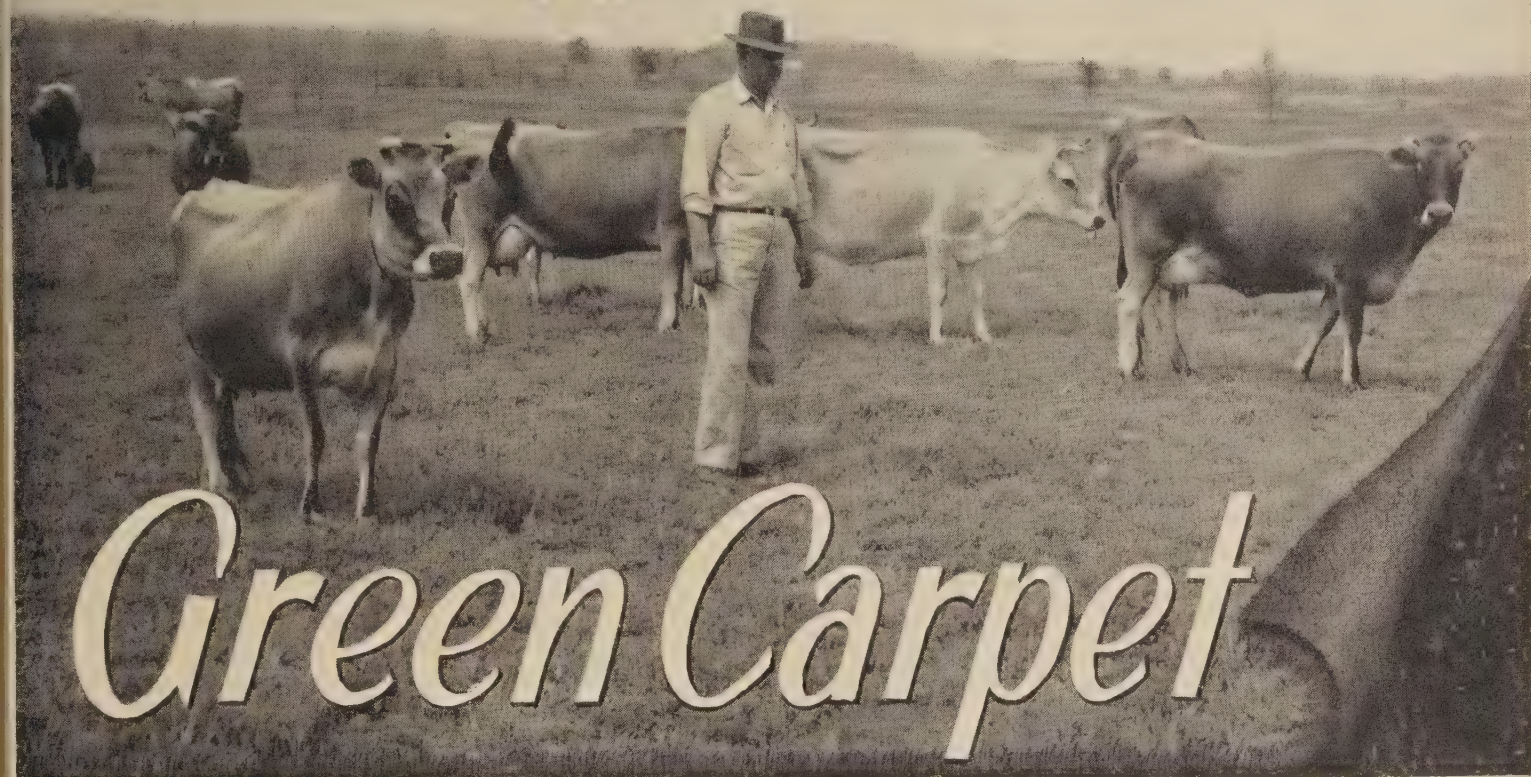
THE COVER.—Contour strip cropping on



C. D. Blubaugh's famed Ohio farm in Knox County. Four-year rotation. Note shocked corn in strips. Thick vegetation catches and holds rain water, while corn rows across slope serve as check to downward flow of water. Photo by G. C. Pace.

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Mississippi ROLLS OUT A



R. A. Coley and Jerseys; winter pasture of oats and crimson clover.

By M. J. KEESEE

NORTHEAST MISSISSIPPI agriculture is shifting from cotton to diversified livestock as a result of farming the land according to its capabilities. Pastures now carpet many a field that formerly grew cotton. The cow has replaced the mule at the head of the livestock procession.

The Northeast Mississippi Soil Conservation District is encouraging the shift in production by recommending a cropping system and land use plan that is more closely geared to the natural capabilities of the land. In this section, the pattern took a form designed to give the proper balance of pasture, grain, and hay for the dairy industry, and at the same time conserve soil and water.

R. A. Coley's experience typifies the financial

gains resulting from the shift in production. In 1938 Coley bought 44 acres of badly eroded land. (See Land Capability Map.)

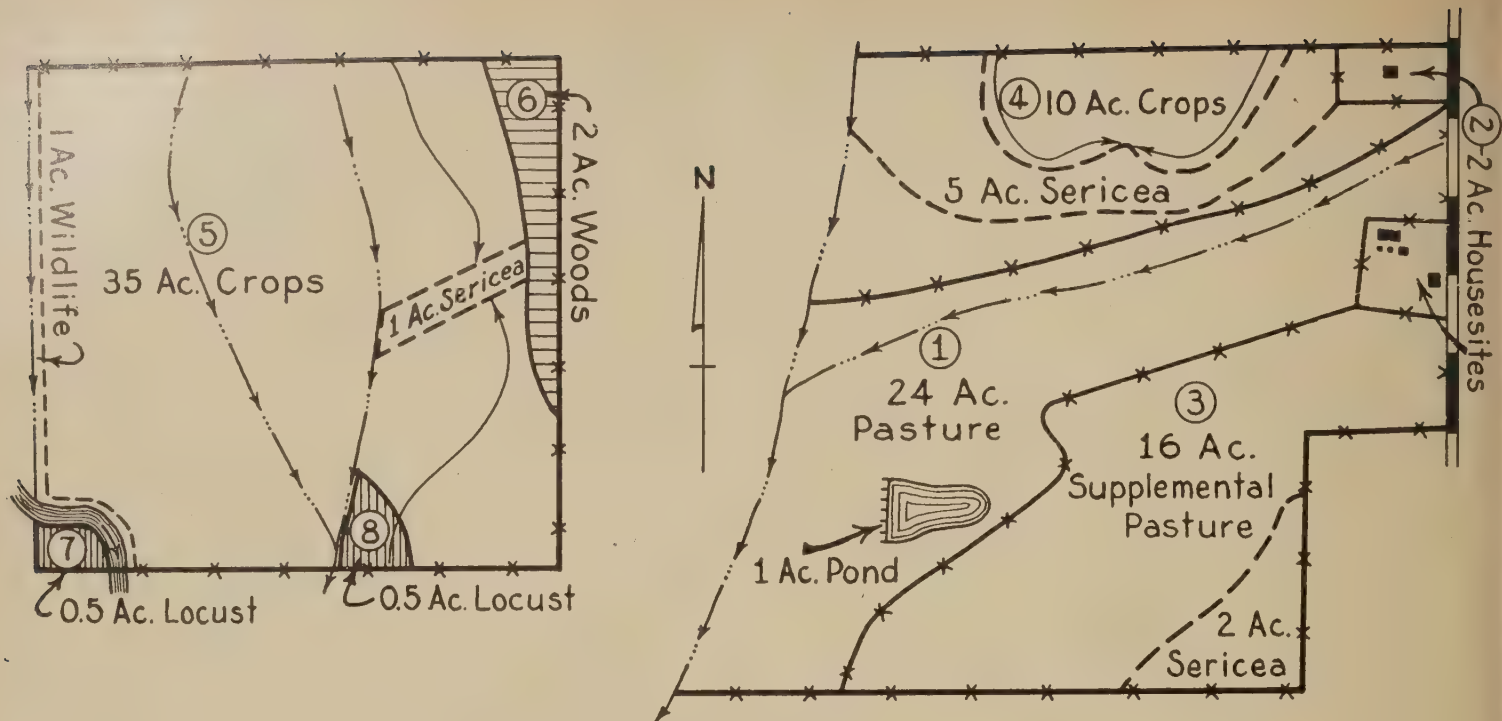
"I got just what was left of the land," the dairy farmer said. "There wasn't a house fit to live in. No barns or sheds. Not even a well. The fences were down."

But Coley moved in. He had 18 scrub cows and the intention of growing cotton and selling milk.

With the assistance from Soil Conservation Service technicians, he started rebuilding. Enrollees in the CCC Camp then at Tupelo, helped to stop the gullies and planted Bermuda grass sprigs in the pasture.

In 1941 Coley bought 16 more acres; in 1943 another 40 acres in Coonewah Creek bottom. This rounds out the land he now owns. From 1940 through 1945, he rented from 22 to 79 acres annually for growing cotton.

NOTE.—The author is district conservationist, Soil Conservation Service, Tupelo, Miss.



LAND USE MAP

R. A. COLEY

TUPELO, MISSISSIPPI

- Maps by -
Soil Conservation Service, U.S.D.A.

Here is a picture of the Coley farming operation in 1940:

Crops	Acres	Yield
Cotton.....	47	205 pounds.
Corn.....	15	25 bushels.
Hay.....	9	$\frac{3}{4}$ ton.
Pasture.....	29	
Truck.....	1	
Miscellaneous.....	1	
Total.....	102	

Normal value \$2,700 or \$27 per acre.

He operated 58 acres he did not own. He had paid \$2,700 for the 44 acres he did own. Note the yields: Cotton 205 pounds lint per acre, and corn 25 bushels per acre.

Contrast this with the following summary of Coley operations in 1946:

Crops	Acres	Yield
Corn.....	22	40 bushels (15).
Silage.....	11	14 tons (6).
Oats.....	16	40 bushels.
Sorghum silage.....	(10)	14 tons.
Lespedeza.....	(16) (75)	2 tons.
Pasture:		
Permanent.....	24	
White clover.....	4	
Oats.....	17	
Lespedeza.....	(16)	
Sudan.....	(7)	
Pond.....	1	
Woods.....	3	
Miscellaneous.....	2 (68)	
Total.....	100 (143)	

Total production:	1940	1946	Difference
Feed crops.....	\$349	\$1, 505	+\$1, 156
Cotton.....	1, 090	-----	-1, 090
Pasture.....	-----	1, 704	+\$1, 704
Total.....	1, 439	3, 209	+\$1, 770

1933-42 average prices:

Cotton, \$0.1163; hay, \$10; oats, \$0.46; milk, \$1.84 per hundredweight; corn, \$0.69; silage, \$1.75; barley, \$0.60; pasture, \$1.50 per acre per month.

Cotton has disappeared entirely. Through the proper combination of crops and double cropping, feed crops were removed from 75 acres, and pasture was grazed on 68 acres of land. Cotton production in 1945, the last year it was grown, had risen to 455 pounds lint per acre. Corn production was up to 40 bushels, silage 14 tons, oats 40 bushels, and hay 2 tons per acre.

In order to compare the total output, the values of crops and pasture produced in 1940 and 1946 have been calculated. These values were based on the 1933-42 prices. This takes out such bias as might result from the rising level of prices during the period. On the basis of these low prices, the farm's total output in 1940 was \$1,439, as compared with \$3,209 in 1946—more than double.

The pattern has changed materially. In 1940 cotton made up 76 percent of the total. Feed crops accounted for the 24 percent balance. Pasture contributed nothing. In 1946 the total farm out-

put was almost evenly divided between pasture and feed crops, pasture having contributed 53 percent, as against 47 percent contributed by feed crops.

Look now at the summary of costs which were required on the Coley farm in the shift from cotton to dairying.

Year	Fertilizers	Ditching and terracing	Buildings	Dairy equipment	Pasture improvement	Total
1940	\$189		\$600		\$150	\$939
1941	167		260	\$235	497	1,359
1942	191		916	40	229	1,376
1943	215		925	225	240	1,605
1944	135		350	1,462	354	2,301
1945	76	\$425			114	615
1946	76		200	380	222	878
1947	239	45	400		224	908
1948	239	53(T)	150		194	636
Total	1,527	523	4,001	2,342	2,224	10,617

These costs are actual through 1946 and estimated for 1947 and 1948, a 2-year period required to complete the conservation plan originally made in 1940. In this 9-year period is required a total investment of new capital in the amount of \$10,617. Of this amount \$2,224 goes for pasture development and improvement, \$2,342 for specialized dairy equipment, \$4,001 for farm buildings, \$523 for drainage and erosion control structures, and \$1,527 for commercial fertilizers for feed crops.

Does it pay?
The value of production rose from \$1,439 in 1940 to \$3,209 in 1946, and is expected to reach \$3,735 in 1948. For the 9-year period 1940-48, total production is estimated at \$30,546, as compared with \$15,121 had the old way of farming continued.

When Darryl R. Francis, agricultural economist of the Federal Reserve Bank of St. Louis, looked at the figures, he said, "An outlay of \$10,617 is a heavy investment in 100 acres of land, but it paid in this instance."

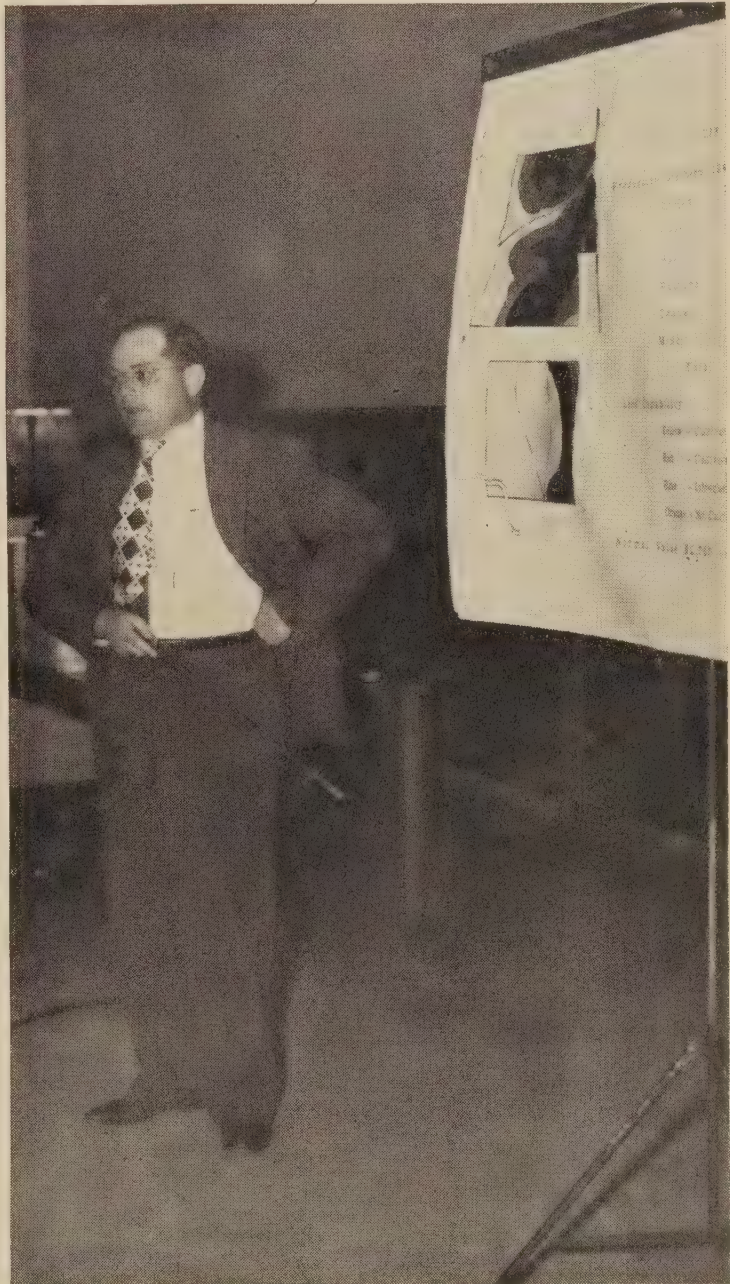
He added: "Feed crops, cotton, and pasture produced for the 9-year period have a total value of \$30,546. Assuming that the old method of farming had been continued from 1940 to 1948, the maximum total possible would have been \$15,121. This leaves, then, a net of \$15,425 increase in volume of output for the 9-year period, which can be directly traced to the soil improvement program and the shift from cotton to a more diversified type of operation."

Under the old system of 1940, with 102 acres of

land and using horsepower, the gross return for each day of labor was \$1.47. Under the 1946 program, with 100 acres of land, and again using horsepower, but with mechanized milking, the gross production for each day of labor was \$4.72.

"This increase," said Mr. Francis, "comes about primarily from shifting from a production pattern that did not fit the natural capabilities of the soil to one which is closely adjusted to proper land use."

Real value of the farm has increased as a result of improving the land. Starting with the bare land value of \$2,700, and adding three-fourths the cost of the buildings on the farm, all of the cost of ditching, terracing, fencing, and water developments, and one-half of the lime and fertilizer



Darryl R. Francis, agricultural economist of Federal Reserve Bank of St. Louis, explains Coley's land capability map.



Coley and visitors: W. R. Thompson, pasture specialist, Extension Service; M. S. Shaw, Extension's assistant director; Dr. Fred T. Mitchell, president, Mississippi State College; R. A. Coley; Chester A. Davis, president, Federal Reserve Bank, St. Louis; R. Y. Bailey, regional agronomist, Soil Conservation Service; James E. Gates, assistant State conservationist; G. K. Strickland, St. Louis; Emmett House, president, Union Planters National Bank, Memphis, Tenn.

cost, the real value of the farm will have been increased to \$7,982—an increase of more than \$50 per acre.

"This program," Francis says, "could have been soundly financed with a farm real estate mortgage. By advancing all of the improvement costs over the 9-year period, the maximum year end loan balance would have been \$3,579, if 60 percent of the annual increased income had been applied on the loan actually under a 60 percent of normal value loan, a maximum of \$4,789 loan balance would have been possible."

Thus, according to the banking economist, despite an extremely expensive improvement program, the full cost could have been advanced by a bank on a first-mortgage real-estate loan and have remained well within the 60-percent normal value limits.

Let us take a look at the human side of the 1947 picture, rather than the banking. There's a nice home, tenant house, barns, silos, ponds, and well-kept fences. The Coley farm has 50 head of Jerseys, 75 percent of which are registered. The pastures and fields are green the year 'round.

Coley bottles grade A milk and sells it wholesale to grocery and drug stores. The dairy route now grosses about \$50.

"I've still got some improvements to make in my cropping plan and land use," Coley admitted. "I intend to plant 7 acres of the temporary pasture to sericea lespedeza. That will give the cows green grazing when the permanent pasture is burned up in the summer.

"When that's done, I'll find something else that needs changing. But the first thing I had to do was to give up the idea of trying to make a living growing cotton on the kind of land I had."

MAGAZINE GOES TO COLLEGE.—Word from South Dakota is that college students are finding SOIL CONSERVATION Magazine just about the best source of suggestions for current reading materials. Maybe the supervisors of your soil conservation district will wish to give the local library a subscription. This will add to the library's material for serving the community. It can be just as good a source of suggestions for reading material for all people interested in agriculture as it is for students.



Little River's No. 1 Hired Hand

Oscar Coleman cups a double handful of seed combined on a 150-acre Dallis grass pasture of the N. B. Bates farm near Idabel, Okla.

By E. S. CORDELL

THE LITTLE RIVER Soil Conservation District, in southeast Oklahoma, is a self-supporting business enterprise. Its activities are so many and varied that it has become necessary to employ a full-time work manager. The supervisors believe that other districts throughout the country will in time follow this innovation of hiring an administrator to look after the details of district business.

The application of soil conservation measures has shown a sustained spurt under the work-manager plan. The activities and responsibilities of the district supervisors, however, have not lessened as one might expect; on the contrary, they have multiplied. Relieved of many day-to-day duties, the supervisors have been able to give greater attention to the broad aspects of administering district affairs. For outstanding accomplishments, the Little River Soil Conservation District board of supervisors won the 1947 award of honor presented by the Oklahoma City chapter of Friends

of the Land. The award is made every year to one board of supervisors in each of the five areas of the State.

The full-time work-manager arranges with the farmers for district assistance in applying the soil conservation program that Soil Conservation Service technicians help to prepare. He sees that the conservation measures are established as set forth in the farmer's agreement with the district. He directs the work of all other district employees. It is his duty to see that district-owned equipment is operated efficiently, economically and safely.

The manager makes all purchases, checks delivery and properly stores equipment, seeds, and other materials. He reports monthly to the supervisors on the use of equipment and materials, the amount of money received and expended and the district's probable future needs. When not otherwise employed, he takes a hand on one of the field jobs.

The work-manager is Oscar Coleman. He directs a crew of 12 men who crush agricultural

NOTE.—The author is district conservationist, Soil Conservation Service, Hugo, Okla.

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Supervisors of Little River Soil Conservation District at headquarters in Idabel, Okla. Left to right: C. H. Walker, secretary; Otto Kupke, G. L. Kirk, chairman; Floyd Marshall, vice chairman, and Oscar Coleman, who is also full-time work manager for the district.



Lime is crushed, delivered, and spread on farms of district cooperators on a cost-plus basis.



LITTLE RIVER

(Continued from page 55)

limestone at the district-operated quarry, haul and spread lime and phosphate, renovate Bermuda grass pasture, mow weeds, construct terraces and diversions, harvest clover seeds, build drainage ditches, plant Bermuda grass, clear brush, and assist cooperators in the application of other conservation practices. Coleman is also a member of the district board. Other members are G. L. Kirk, chairman; Floyd Marshall, vice chairman; C. H. Walker, secretary, and Otto Kupke. These men are endeavoring to make 1947 as good a year as 1946, when twice as much conservation work was applied to the land as in any previous year.

"I am convinced the soil-conservation districts provide the best means for carrying on the badly-needed work of conservation," Chairman Kirk declared. "The districts are truly democratic political subdivisions created and managed by farmers. After all, we farmers have the primary responsibility of conserving the land and it is only natural that we should exercise the authority that our State law gives us to fulfill that responsibility."

On April 11, 1938, 949 land-owning farmers voted to create the Little River Soil Conservation District. The district set up headquarters in Idabel. Starting from scratch, the supervisors borrowed money to buy equipment and materials to lend to cooperating farmers. From the start, the supervisors have operated the equipment on a cost-plus-maintenance basis. To date more than \$26,000 worth of equipment has been bought and more than \$100,000 worth of business transacted. In 1946 the supervisors transacted \$52,000 worth of business in helping cooperators establish conservation programs. Emphasizing teamwork, the supervisors encourage farmers to take advantage of the assistance offered by all agencies operating in the district.

To the end of 1946 Soil Conservation Service technicians had helped 513 farmers to plan and apply a coordinated soil conservation program to 66,000 acres. The total included 7,000 acres of permanent pasture, 16,000 acres on which grazing was properly regulated for the first time, 74 stock ponds, 56 miles of terraces, 8,000 acres of crop residue management, 3,000 acres of contour cultivation and 6,000 acres of cover crops.

The supervisors made many of these practices possible by making available to cooperators 27,000

pounds of seed of Korean lespedeza, 30,000 pounds of Kobe lespedeza, 2,600 pounds of sericea lespedeza, 36,000 pounds of hairy vetch, 10,000 pounds of rye, 8,000 pounds of rye grass, 4,500 pounds of mixed clovers, 500 pounds of carpet grass, and 500 pounds of Dallis grass; 1,666 tons of agricultural limestone and 500 tons of rock phosphate.

REMARKABLE REMARKS.—"We must have more 'crazy' people—erosion-crazed, conservation-crazy—people who see beauty in the idle ribbon of water behind the terrace, in the calm waters of the pond, in the pattern of contrasting crops on a contour, in grass instead of sculpture in the gully, in pasture on the hill and clear water in the streams. In those pictures is genuine beauty . . .

"The signs etched on the land are, for our civilization, the handwriting on the wall. Any place you go, any direction you travel, those signs stare you in the face . . . the handwriting on the land! . . .

"Every citizen must learn of his personal dependence on the fertility of the soil that's now here; he must learn how his children's future and their prosperity will inevitably be measured in terms of the soil that's lost or saved; he must learn to read the signs he sees as he drives down the highway . . .

"If our people could be taught one thing, how to read into the signs etched on the land, their true meaning, then the battle would be half won. That's something everybody must be taught. Not just the farmer."—WALTER HUMPHREY, Editor, *Fort Worth Press*.

SPECIAL ISSUE.—Sometime this fall, probably November, there will be a special issue of *Soil Science* entitled "Soil Conservation and Good Land Use." This special issue will be dedicated to Dr. Hugh Bennett, Chief of the Soil Conservation Service, and will contain a picture and a brief biography of him. It will be made up of eight articles, one by Dr. Bennett and one by the regional conservator of each of the seven regions of the Soil Conservation Service. Dr. Bennett's article will be an over-all presentation that will emphasize the history of the soil conservation movement. Each of the regional conservators will discuss the conservation problems of his region.

Those of you who want personal copies of this special issue will need to order them before publication. The editor is Dr. Firman E. Bear, Rutgers University, New Brunswick, N. J. Paper-bound copies will cost 60 cents and cloth-bound ones \$1.00.

From Council Bluffs comes news that the city's chamber of commerce is considering subscribing to *SOIL CONSERVATION Magazine* for about 100 farmers. This project is recommended by the chamber's agricultural committee. District Conservationist Thoreson says that other chambers of commerce out his way are contemplating similar action.

Leadership IS WHERE YOU FIND IT

by R.Y. Bailey



Jo Lita, the McDowell's older daughter, hears a lot of talk about sericea, kudzu, terraces, outlets, Kentucky 31 fescue pastures, Ladino clover and other terms that would be strange to a city-bred child. She is getting first-hand information about sericea from her father.



This lush pasture of grass and clover has done much toward establishing Wilburn McDowell's place of leadership in his community. Neighbors often say when applying to the Soil Conservation District for help, "I want a pasture like Wilburn McDowell's."



Every furrow on the contour is an unbroken rule on the McDowell farm.

LEADERSHIP is where you find it. I found an inspiring example in middle Tennessee. Willburn McDowell and his wife, who live with their two young daughters on a 78-acre farm 4 miles northwest of McMinnville have not been elected or appointed to any positions, but they have developed a leadership in soil and water conservation that is felt throughout their community.

McDowell is a lean, soft-spoken young man of 28 who, with the help of his wife, has done such an outstanding job of remaking a run-down farm that his neighbors visit him two or three times a year to observe and learn. Most of his neighbors have made a good start toward developing well-planned soil and water conservation programs on their farms.

McDowell had a lot of problems on his poor farm when he applied to the Warren County Soil Conservation District for help. This was in the spring of 1943. Earl K. Schultz had been assigned by the Soil Conservation Service to assist the district with its program. He helped McDowell make a complete soil and water conservation plan on his farm.

Schultz is a man who takes seriously the responsibility of helping a farmer develop a plan on a farm that is his source of income. He gives as much patient thought to the job of working out the best use and treatment on the land of small farmers as he uses in work-

NOTE.—The author is chief, regional agronomy division, Soil Conservation Service, southeastern region, Spartanburg, S. C.

ing with the larger landowners. He found a job at McDowell's farm that called for all his skill. It also called for all of the infinite, painstaking effort that is a part of Schultz. He saw when he looked over the soil conservation survey map that his farm was a tough one to plan.

At that time the farm consisted of 61 acres. McDowell bought adjoining land last year to bring his total up to 78. The sloping fields were poor and some of them had real man-size gullies across the slopes. Much of the land was underlain by a hardpan that limited its use.

McDowell could not put a great deal of money into developing a soil and water conservation plan because his gross income was only \$450 in 1943. He had a wife and baby to support; the second daughter came along since that time. His crop yields were low and he could not expect them to increase in yields until his land was improved.

There was need for terraces and vegetated waterways. Some of the gullies had to be filled before terraces could be built. This entailed a lot of expensive earth moving. There was little farm equipment and one team of light mules was all the power available.

Soil Conservationist Schultz and Farmer McDowell went into all of these things carefully as they planned the details of land use on the different fields. The work could be done quickly and easily if heavy power equipment could be hired, but that would take money. The other alternative was for the work to be done slowly with the team, a plow, pan scraper, and V-drag. This method would necessitate a lot of hard work but very little cash.

McDowell needed all the money he could get for lime, fertilizer, and seeds to build up the productivity of the soil after he got the mechanical jobs done. Though it was going to take a lot of sweat, and maybe a few tears thrown in for good measure, he went along with Schultz in making a plan, and agreed to apply whatever it required.

Since 1943 McDowell has completed the gully-filling jobs, done all of the smoothing and shaping required to get four waterways ready for seeding, and has built about 3 miles of terraces to the

agreed specifications. All of this mechanical work was accomplished with his team of mules and his modest farm equipment. His wife often lent a helping hand. Only 4,000 feet more terracing now remains to be done and this will be taken care of after the corn has been harvested this fall.

McDowell's was not a terracing program; it was a complete soil and water conservation plan. Important as were the terracing and gully-filling jobs, ground cover to keep the gullies from being washed out again had to be provided by growing vegetation. Schultz had told McDowell during the planning that the land had to be covered and he also told him that the land would be too poor to grow the kind of vegetation needed, unless it were limed and fertilized. Every acre of open land, except 10 acres bought last year, has received 2 to 3 tons of ground limestone and 500 to 600 pounds of 0-14-0 fertilizer. Samples of soil are being sent to the laboratory of the Tennessee Crop Improvement Association at Nashville and additional fertilizer will be applied as indicated by the reports from the laboratory.

All of the four waterways that were planned as a part of the water-disposal plan are now well protected by good stands of sericea lespedeza or by mixtures of grasses and clovers. Vegetative protection was established before terrace water was turned into the waterways and the vegetation is being maintained in vigorous condition by additional fertilizer, including chicken manure.

In planning the use to be made of all land on the farm, Schultz and McDowell had a problem of 12 acres that were more eroded and gashed by gullies than the rest of the land. This eroded soil was on fairly steep slopes and was permeable, so it was planned for kudzu.

McDowell had visited a patch of kudzu near his farm and carried a small amount of the green forage home to his cows. The cows ate it so readily that he decided he wanted enough acreage of kudzu for late summer and fall pasture. He had kudzu 4, 3, and 2 years old and has pastured the oldest during dry periods the last two summers.

In relating his experience with kudzu for pasture, McDowell said, "It was just like letting the calves suck the cows when I took them off kudzu and put them on other good pasture. You could tell the difference in the amount of milk the first day. There just isn't any better pasture and I'm

Farmer-tenant leases, with emphasis on encouragement of soil conservation farming, will be discussed by outstanding authorities in early issues of *Soil Conservation Magazine*.



Seed will be harvested from this mixture of Kentucky 31 fescue and ladino clover to plant 14 additional acres.

getting it on the worst gullied and thinnest land in this country. My best kudzu now is on old gullies that were used as the community dump a few years ago."

Two and a half acres of eroded land that was not capable of making more than 10 to 15 bushels of corn per acre is now growing a vigorous stand of sericea lespedeza for hay and seed. Some of this land was reclaimed from idleness and gullies.

The soil conservation survey map had to be studied carefully to find land that was permeable enough for alfalfa. Two acres were found and alfalfa is making fair growth, but McDowell can take you out on the land and show exactly where the "pan" ends and the permeable soil begins. He uses the growth of plants as his indicator.

Two acres of the land that was reclaimed from idleness and gullies, and terraced, now are pro-

tected by an excellent stand of mixed clovers and grasses. Two additional acres are covered with a good stand of Kentucky 31 fescue and Ladino clover that was seeded in September 1946. Seed will be harvested from the grass and clover to plant 14 additional acres of terraced land and one additional waterway. Four acres of thin land that was terraced has been seeded to a mixture of red-top, orchard grass, and Ladino clover. A patch has been seeded to red clover and another to Italian ryegrass and white clover.

Contour tillage was one of the practices agreed upon when the plan was made. Every furrow and every row on this farm follow the contour. All plowing, harrowing and seeding also are done on the contour.

An orchard to produce fruit for family use has been planted on the contour. The orchard will

be seeded to white clover and ryegrass this fall.

McDowell manages all of his pastures carefully to prevent overgrazing. He mows and grubs to control bushes and blackberry briars. He uses electric fences rather extensively, but is building permanent fences as rapidly as farm income and other conditions permit.

Cultivated land is protected by a rotation of corn, small grain, and a meadow mixture of lespedeza, redtop, and Timothy in a 4-year cycle. Yields already have increased substantially. Corn yields are 35 to 40 bushels an acre where they once were 15 to 20 bushels. He now makes 20 to 25 bushels of oats where he formerly grew none.

McDowell protects his 15 acres of woodland from fire and grazing. He has cut some of the mature trees and had them sawed into lumber that is to be used in farm buildings. He does not expect to clear any more land, but plans to remove undesirable trees as needed on the farm and interplant with trees of desirable species.

As a result of the soil and water conservation plan on his farm, McDowell has all of his land under a cover of protective vegetation most of the time. This vegetation was selected according to the capabilities of the land and the plants. He is marketing the grain, grass, and clover through livestock. Seven dairy cows and 100 hens help convert the products of soil and water conservation into cash.

Seed corn is his third source of income. In 1946 the total income on this small farm was \$3,500, which is in sharp contrast with the \$450 income in 1943. No claim is made that all of this increase came directly from soil and water conservation, but the increase could not have been made without the improvement in the land under his plan.

McDowell believes in soil and water conservation. He said, "This is the only way to handle this land. If I didn't follow conservation measures I would slip back. I feel sure I would have starved out on this place in 4 or 5 years more."

In addition to the help received from his soil-conservation district, McDowell received small quantities of kudzu plants and sericea lespedeza seed from the nurseries of the Soil Conservation Service. These were supplied as incentive materials to get field plantings made in the community for their value in showing local farmers what these crops would do.

The Farm Security Administration made him a standard type loan to improve his cattle. He

had made full use of assistance that was available through AAA. He has spent several dollars of his own money for each dollar spent by any agency in helping him.

The McDowells have used most of their money and labor in improving their land, but they expect to build a new home when prices come down. They also have plans for a milking machine and other electrical appliances that will lighten the work in the home and in the barn.

My visit to the McDowell farm was one of my most inspiring experiences. It gave me a sort of "been-to-church" feeling. So long as there are young people who are willing to work intelligently for what they want, there is good foundation stock left in this country. And when they have the painstaking guidance of technicians like Earl Schultz it's a mighty good combination.

Although the McDowell leadership has been local, its influence is very real in their home community and is spreading. Visitors from distant States and from foreign lands will find their way to the door of these young people. Their names may never be written with that long list of distinguished Tennesseans who have contributed so largely to the development of this Nation, but their contribution is no less real and vital.

QUOTABLE.—"Soil is not really saved at conferences, conventions or clinics. Rather, the soil is and must be saved on farms by farmers. . .

"The most effective way to get people to act and act quickly is to make an appeal to their basic instincts. Three of the most basic instincts common to all human life are: (1) Preservation—the urge to survive. (2) Patriotism—to one's family, community, and Nation. (3) Piety—respect and reverence for the God we worship and all that He created.

"We want to get everybody interested and active in saving the soil. We should, therefore, try to use the power of an appeal to these three basic instincts. It is perfectly logical to present the case for saving the soil in this manner. . .

"Nothing, literally nothing, has ever succeeded over a long period of time on a poor and worn-out soil. That means that the world's welfare, as well as our own, is irrevocably tied to the fertility and productivity of the soil."—DR. IDE P. TROTTER, director, Extension Service, Agricultural and Mechanical College of Texas.

Jesuit Fathers ARE SKILLED STEWARDS OF *the Soil*

By GUY R. JONES

KNOwn for their agricultural skill, the Jesuit Fathers have left their imprint on the soil at St. Charles College, Grand Coteau, La.

Almost from the time the college was established in 1837, the Fathers planned and toiled to make the institution's 800-acre farm productive. For more than a century the farm has supplied the institution with food, and contributed to the financial support of the Jesuit organization by the sale of surplus produce.

Not only did the Jesuit Fathers engage in the practical business of raising food; they also gave attention to the landscaping of the college

NOTE.—The author is district conservationist, Soil Conservation Service, Opelousas, La.

grounds. Today these grounds are one of the beauty spots of the South. Flowers, shrubs, fig, pear, and orange trees, a grove of pines, pecan trees, and giant, moss-draped liveoaks—all these combine to make you feel that you have stepped back a century to the days of the old South when gracious living was the pattern.

Erosion began soon after the land was put in cultivation and the farm declined gradually but steadily until recent years. The Jesuit Fathers did not, however, sit idly by and watch the topsoil wash down sloping fields into the bayou while



Evans Noel, farm foreman, shows sweetpotato vines left on ground for grazing after harvest of crop. Planted to sweetpotatoes and oats in alternate sections, this once-eroding field is contoured and terraced like the rest of the cultivated land.



Cattle are turned into sweetpotato fields after harvest to clean up vines and potato culls. Besides providing nourishment, this practice is believed to reduce the weevil menace. A strip of oats, also for grazing, is barely glimpsed at left.

gullies grew wider and deeper. They took various steps to check the loss of soil, and they were among the first to offer their cooperation to the Grand Coteau Ridge Soil Conservation District when it began operations in 1940. In December of that year the college signed an agreement with the district to apply a coordinated soil conservation program to its farm. The program was completed in 1944 and has since been on a maintenance basis. In 1946 the college was awarded a certificate of merit by the Louisiana Bankers Association in recognition of its outstanding soil conservation work.

Under its conservation program the college built almost 5 miles of terraces to keep the rain from dashing down the slopes, cutting gullies, and washing topsoil away. The terraces ease the water into outlets covered with vegetation that protects the soil. Contour furrows on all the cultivated land and the terraces support each other. Seeded to common lespedeza and Bermuda grass, the terraces produce hay for the farm's livestock.

Other dovetailing practices in the conservation program included cover crops that help to maintain or increase fertility and that protect the soil at a time of year when the land otherwise would be exposed to erosion; cutting the remains of harvested crops into the ground surface to return organic matter to the soil to help absorb moisture and resist erosion; seeding pastures to hasten the development of nutritious grasses; and stocking the pastures at a rate to avoid excessive grazing and to give good grasses and legumes a chance to grow and spread. Fertilizers are also applied as



Front of main building. The college grounds are noted for their beauty. The farm is now a thriving enterprise; erosion controlled and productivity restored.

needed. Rotation of crops rounds out the program.

In planning and applying the program, the college had the assistance of technicians of the Soil Conservation Service work unit in Opelousas and of other agencies.

Brother Martial O. Lapeyre, farm superintendent, says, "Conservation helped in eliminating the wash from our cultivated fields. In a dry season, it has a tendency to hold moisture in the ground.

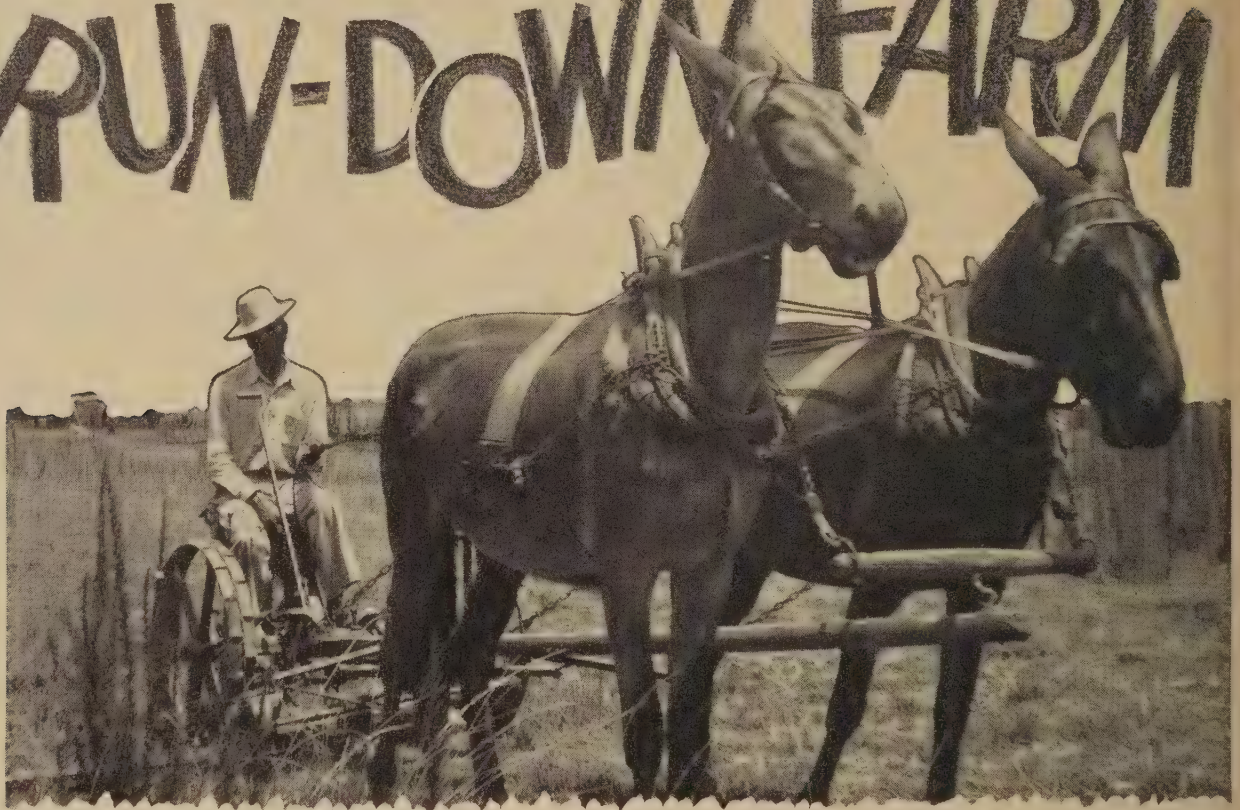
"We have no accurate records before the conservation program was installed but I estimate that conservation has increased yields one-fourth to one-third."

A century ago the crops were cattle, sugarcane, and truck. Today they are sweetpotatoes, corn, truck, hay, beef, milk, and pecans.

The farm usually has about 30 Holstein cows and 70 head of mixed beef cattle. There is year-

(Continued on page 69)

He tackled a **RUN-DOWN FARM**



Waddleton mows to control weeds. His pasture has been cleared of shrubs, then leveled, sodded, fertilized, and seeded to Kobe lespedeza and white Dutch clover, excellent forage plants.

By OTHO J. GIPE

O. W. WADDLETON faced a gloomy future when he bought a 50-acre farm near Winnsboro, Tex., in 1939. Badly eroded, the farm had become so unprofitable that the previous owner had not been able to make a living from it even when he stopped paying taxes and interest on a loan on the land. After severe sheet and gully erosion had put 12 of the 50 acres out of production, the former occupant had given up and moved away.

Waddleton bought the run-down place for \$450 through the Federal Land Bank. When he moved to the farm in the fall of 1939, its average income had been \$400 to \$500 a year, all of which was derived from cotton and corn. The average cotton yield was about one-fifth bale per acre, corn 10 bushels per acre.

With a large family to support and a down-at-the-heels farm to do it, Waddleton confronted a

hard and discouraging job. He applied himself diligently, worked long, tiring hours. He put in other crops besides corn and cotton. He got some stock. Gradually he built up his income. From 1940 through 1944 he increased the average income to about \$770 a year—\$190 from 2 bales of cotton produced on 5 acres; \$50 from 100 bushels of corn on 10 acres; \$150 from truck, including sweet-potatoes and peas; \$300 from milk; \$55 from 2 calves; and \$25 from chickens.

Although Waddleton built up his income, the future looked even worse than before because erosion was occurring faster and faster. Waddleton realized that as the topsoil washed away, the farm would become less and less productive and no matter how hard he worked he would be unable to maintain the income, still too small to support his large family properly. It looked like a losing battle.

Then he heard about soil conservation districts and went to see the supervisors of the Hopkins-

NOTE.—The author is work unit conservationist, Soil Conservation Service, Winnsboro, Tex.

Rains-Wood Soil Conservation District in which his farm is situated.

"My land was really going downhill fast when I signed my agreement and the Soil Conservation Service technicians came out to help me, Waddleton recalls today. "Heavy rains had made the erosion much worse after 1940 and gullies were cutting into several areas. Things looked bad for me then."

With hope in his heart for the first time, in the summer of 1944, Waddleton set to work on his conservation program. Using his own work animals and district-owned equipment, he began a system of terraces to hold the rainwater in check. He has now completed 10,000 feet. To stop gully-ing and level off gullies, he planted kudzu, a crop that also is used for grazing and hay and that brings in additional revenue when its crowns are

Waddleton's cotton yield has increased from $\frac{1}{5}$ to $\frac{1}{2}$ bale per acre, corn from 10 to 30 bushels, sweetpotatoes from 60 to 200 bushels. In 1946 he received \$1,100 for his cotton and sweetpotatoes alone. From 2 acres planted to peanuts following a crotalaria crop, he harvested 4 tons of hay which he fed to his stock and 4 tons of peanuts which he sold for \$360. Before he began his conservation program the farm could carry only three milk cows and calves and four head of work stock, but now it supports eight milk cows, three head of white-faced beef cattle, five calves and four head of work stock.

In the past 12 months Waddleton has received \$800 for milk, \$250 for calves, \$100 for chickens, \$400 for table peas and \$150 for Irish potatoes, total cash income from crops being \$2,110. This

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Betty Ann, Florene, Lodean, O. W. and Glenn Waddleton chop cotton planted on contour after crotalaria has improved soil. The terrace bearing corn on the left was made by Waddleton with his team and a terracing plow furnished by his soil conservation district.

sold. His entire cultivated area has been seeded at least once to crotalaria and most of it to Austrian winter peas, crops that add nitrogen to the soil and improve its texture and composition. Sericea lespedeza is used as an erosion-controlling, soil-improving, grazing and hay crop. Waddleton has cleared 3 acres, levelled and seeded his entire pasture to Kobe lespedeza and white Dutch clover to improve and increase the livestock forage. He fertilized the pasture with 400 pounds of phosphate per acre to insure a good stand of nourishing forage plants. He mows the pasture to control weeds that otherwise would compete with the forage plants. Today every acre of the farm is in productive use.



Waddleton and son Glenn in 4-acre field of kudzu, the plant that holds soil, stabilizes gullies, furnishes grazing and hay, yields cash from sale of crowns.

Among the Conference leaders, left to right: Dr. Otto Rahn, Editor Russell Lord, C. M. Long, Dr. Paul Cannon, Paul Bestor, M. L. Wilson, Warren S. Thompson, Chester C. Davis, Dr. Jonathan Forman.



They talked of **LIVING SOIL**

By MORRIS E. FONDA

ONCE AGAIN we met—commoner, doctor, farmer, conservationist, professor, and many others—for the sixth annual conference on conservation, nutrition and human health. On June 28 and 29 more than 200 of us gathered together under McGuffey's elms on the campus of Ohio University at Athens to hear outstanding authorities from all corners of the Nation discuss nutrition and all of its ramifications.

There was a sense of expectation as the group gathered for the tour on Saturday morning. But it seemed to me the conference really got under way when Ollie Fink offered his celebrated "pyramid of water" explanation. Although minus the

customary currency which Ollie often displays as he dares any member of the audience to name a material which water did not help develop, he did relate the dramatic story of water and its importance to other resources.

In his discussion of the living soil, Dr. Otto Rahn, professor of agricultural bacteriology at Cornell University explained very simply the movement of elements—from man to the soil, to the plant, to the animal, and finally back to man. I think most of us sat up in our seats rather sharply when Dr. Rahn reminded us that the elements which our bodies contain today are identical with those which were in the bodies of dinosaurs thousands of years ago. Of course, the rota-

NOTE.—The author is head, education section, Soil Conservation Service, Milwaukee 12, Wis.

tion has been completed numbers of times in between!

Although many of us believe that bacteria is quite evenly distributed in the air and in the soil, Doctor Rahn explained that about 99 percent of all bacteria is in the soil—and that soil not only has bacteria but many other organisms. "After all," said Dr. Rahn, "animals, including man, are not necessary for the world to go on."

Dr. R. H. Bray from the University of Illinois discussed plant nutrients in soil. We were told that an acre of soil 14 inches deep (average condition) contains 420,000 pounds of muriate of potash; 1,200,000 pounds of 20 percent super phosphate; and 9,000,000 pounds of Ammonium sulphate. Nature never did quite figure out a way of having a storehouse for nitrogen and oxygen, the mobile elements. Nitrogen is usually in quantities smaller than plant needs for maximum production—consequently, the size of the plant's root system is an important factor in its ability to secure these mobile nutrients.

Dr. Carl Huffman, Michigan State College, afforded the group some good laughs while presenting his paper on deficiency of trace elements in animals. Many of us could not quite imagine how the good doctor could transport all of the sizable hair balls which he brought along to display to the assembly. They were of various sizes and forms—illustrating a symptom of deficiency of a trace element. Pictures of cattle suffering from cobalt deficiency were shown and when this trace element was supplied in the proper proportions the trouble was removed. Wood chewing, hair eating, and sucking could all be symptoms of trace element deficiencies.

Louis Bromfield was in fine fettle addressing the group Saturday evening. He gave the story of his farm—of the results he is securing from the application of soil conservation and generally good agricultural practices. I have heard Louis tell of his farm on several occasions, but never have I heard the same story twice. After his talk an open discussion brought out many interesting and thought-stimulating questions. Louis Bromfield, Dr. Forman, Ollie Fink, and others helped with the right answers.

M. L. Wilson, Director of Agricultural Extension and Ladd Haystead, farm editor of *Fortune* magazine held forth on Sunday. M. L. discussed the need for educational processes. In his inter-

esting fashion, Ladd Haystead told about many of the new gadgets now being used successfully in farm buildings and homes. These modern improvements included such things as the push-button system of silage dispensing; manure cleaners, minus rubber boot protection; the new wonders in the farm home which electrification has brought—in fact, farm folks can now have every thing city people have, plus all the advantages of rural life.

Robert Cook, editor of the *Journal of Heredity*, talked about the conservation of genes and soil. He pointed out that soil erosion and gene erosion accelerate one another—that we are squandering our intellectual topsoil in each generation. The results of a survey disclosed that the woman college graduate averaged one child—an example of population erosion. Dr. Thompson, director of the Scripps Foundation for research on population problems at Miami University, gave evidence in his paper on population problems. "We cannot withdraw," he said, "in our own shell and let the rest of the world go by. Upward population trends is still one of the world's major problems."

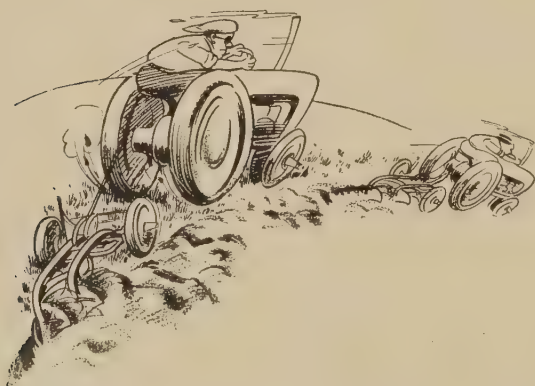
Dr. Hedback, prominent physician of Minneapolis, Minn., could not attend but his paper on the aging of man was read by Dr. Forman. Dr. Hedback's paper related how man had for ages been seeking a means for a longer life. Lower animals outlive their growing period by five or six times and by the same rule the human species should approach 125 to 150 years. Some progress is being made along these lines. In 1900, 18 percent of the population was over 45 years of age and in 1940, 27 percent was over 40. Both child care and removing some of the deficiencies in the sunset zone of life helped. However, Dr. Hedback pointed out that life cannot be measured alone by merely an increased span but it also must be judged on the basis of useful accomplishments.

Dr. S. A. Wilde, of the University of Wisconsin, discussed forest soils and forest growth. He brought out the fact that woods constitute the only crop in this country not in danger of overproduction for a long period of time. Dr. Paul Cannon, of the University of Chicago, gave us much food for thought in his discussion of proteins. He related the results of amino acid deficiencies and stated that protein needs for maintenance are less exacting than those for growth—but that proteins are very essential for good health.

C. M. Long, farm manager from La Fayette, Ind., discussed the farm conservation plan. It was extremely gratifying to all professional soil conservationists, I am sure, to learn how a private farm manager is basing his work and developing his plans on the fundamentals of soil-conservation methods. Starting with the soil and capability of land, Long related how he and his associates assist landowners to develop farm conservation plans which have as their end product a soil kept at home and a better farm income.

Dr. Curt Richter from Johns Hopkins University discussed dietary habits and gave the group the results of much research in this field. I was impressed by his statement to the effect that reliability of appetite is a guide to dietary needs. DeWitt Wing from Normal, Ill., discussed pedigree breeding and gave his views on general land problems.

Dr. Forman summarized the conference as the sun started to set over the stately elms. It was a good conference, one where the sands of knowledge on soil health are gradually accumulating. This session pointed out the need for more and more information on a subject which appears to be of vital importance to all of us.



SUBSCRIPTIONS ON THE CONTOUR.—Bruce Clark, Illinois' State conservationist, observes that, "Subscriptions to SOIL CONSERVATION will probably be given to those entering the contour-plowing contest in the Livingston County Soil Conservation District."

DISTRICT ITEMS WELCOMED.—Several pages of this issue are devoted to items of district experience culled from letters written by farmer-cooperators. This is one way to keep up with what's happening out across agricultural America. This magazine is eager to have first-hand information of this kind.

REVIEWS

FARM MANAGEMENT. By Black, Clawson, Sayre, and Wilcox. The MacMillan Company, New York, 1947. 1,055 pages. Illus. Price \$5.50.

This book was written primarily for use in the junior and senior years in agricultural colleges. However, the nature of the material covered the very practical approach to the problems of farm management, and the easy style of writing should make it of considerable interest to farmers, soil conservationists, professional farm managers, and others dealing with farm management problems.

The book's analysis is in terms of the farm as a whole. Case examples are used freely, and the principle and its application are taught at the same time. This makes meaningful the treatment of the various problems.

No rules for successful farming are laid down. Instead, an attempt is made to provide a method of analysis that any farmer can apply to a situation of his own. Stress is laid on alternative methods of management that will fit the physical situations on different kinds of farms. Soil conservationists who are daily dealing with these very complex problems would do well to study this work, particularly for help in analyzing the farm business and determining the various alternative methods of management.

Because of the book's logical organization, one need not be frightened by its 1,055 pages. It is easy to pick out those particular problems in which the reader is interested and one need not read the entire book to get a lot of help out of the individual chapters.

Considerable emphasis is laid upon the time span for which farm plans should be made. The authors point out that "the optimum use of resources is obtained when they are so used as to contribute the maximum to production over the whole time span of their use." They also state that farm plans should be made to cover a long period—10, 15, or 20 years and in some instances even up to 50 years. These principles have been stressed in all the discussions of farm planning and management throughout the book.

Chapter 28 deals with planning the farm. The authors state that the basic information required for any job of farm planning must include first of all a map of the farm. Generous illustrations are given of soil survey maps, conservation survey maps, and farm lay-out maps. The principles of land classification are illustrated by case examples of specific farms identified by location. The authors are to be commended for their emphasis on the physical inventory of a farm as a starting point for farm planning. Unfortunately, the description of the land classification system used by the Soil Conservation Service as described in this book is not up-to-date. The system described here covers the classification scheme which involved only five land-use capability classes. This system was revised in 1941 to include the eight land-use capability classes now being used by farm planners through-

out the Soil Conservation Service. The principles of land classification and their use as discussed in this book, however, are very sound and should be recommended to anyone dealing with farm-management problems.

In the chapter on the role of public agencies in farm management, it is disappointing to note that only two lines are devoted to the role of soil-conservation districts. The previous discussions of planning a farm so accurately describe the procedures followed in soil-conservation districts in the making of conservation farm plans that it would seem somewhat fuller treatment of the districts' functions would have been appropriate.

This book is one of the most practical treatises on farm management to appear in recent years. The reader is not encumbered by a large volume of hard-to-understand statistics, but he is aided in his reading by an easy style of writing, his agreement with the authors' practical approach to various problems, and only sufficient statistical data to constitute valuable reference material.—A. M. HEDGE.

He Tackled a Run-down Farm

(Continued from page 65)

is in addition to the value of the corn and hay and other livestock feed crops and the food grown for family use.

In 1945 Waddleton sold half of his 2,000-pound crotalaria seed crop and with the proceeds paid off the loan on the farm. He has built a \$1,000 barn and plans to build a new house next year. He pays taxes promptly in order to benefit from the usual discount.

Through hard work and an intelligent application of a coordinated soil-conservation program, Waddleton has changed an eroded, run-down, abandoned, tax-delinquent piece of land into a profitable farm enterprise. He looks to the future now with a knowledge of security for himself, his wife and their 10 children.

Jesuit Fathers Are Skilled Stewards

(Continued from page 63)

round grazing at the rate of a cow per acre. The college buys supplemental concentrate feeds. The dairy cattle was also fed grass silage, the grass coming from the meadow and pasture land. With the grazing land divided into three parts for rotated grazing, the improved pastures are carrying more cattle than ever before.

The farm is divided roughly as follows: Cultivated, 100 acres; pasture, 100 acres; meadow, 30 acres; woodland, 500 acres; and college grounds,

70 acres. The woodland provides fence posts. In earlier days it also supplied fuel.

Dallis grass, common lespedeza and small amounts of Johnson grass compose the vegetation of the pastures and meadow, all overseeded with mixed clovers. Soybeans are grown with the corn to help protect the soil against erosion and to enrich the land for the next sweetpotato crop. After harvest the cattle are turned into the fields to forage the soybeans, potato vines, and potato culls left on the ground. Cleaning up the potato crop in this way is believed to reduce weevil infestation.

PROFITABLE UNDERTAKING.—"In 1940 my farm was not making a dime of profit and hadn't made a profit for several years," wrote L. L. McAlister, Greensboro, N. C., recently. Then this farm, through his soil conservation district, obtained help from technicians of the Soil Conservation Service. A farm plan was developed, custom-built to cope with his particular set of problems.

"I found out the total cost of helping me plan and carry out a conservation system was approximately \$135. The Government invested \$135 in me and the land I farm.

"So far I have paid into the United States Treasury a total of \$2,511.98 on account of income the farm produced. I will pay about \$1,000 more this year."

50 BUSHELS BIG AND STOUT.—"I want to tell you what I made and saved by contouring a 20-acre field that I have farmed for 42 years, that was broke and planted on contour (first time) to corn in 1946," says Jim Hester, Homer, Ky.

"This field runs from 6 to 10 percent slope on three-fourths of the field. The Soil Conservation Service laid it off on the contour.

"This field was planted on the 30th and 31st of May.

"And on the 1st evening of June, 24 hours later, we had a hard, quick rain.

"Threw the branches full and overflowing.

"Knowing this field as I did, I dreaded to go back to it for I was sure 35 percent of my fertilizer was in Green River and perhaps 20 percent of my corn.

"But, to my surprise, I don't think I lost a handful of corn or over 1 percent of fertilizer.

"This field has never before made over 40 bushels per acre. But this year it made 50 bushels big and stout."

FARM MAPS TELL STORY.—"I started contour farming in 1942," says Maynard Brandt, who lives on a 120-acre farm in Sauk County, Wis.

"We now have 240 rods of diversion ditches above fields and 65 acres of contour strip crops. We have planted 2,500 trees on a steep hillside and renovated 4 acres of pasture land. We have a much better knowledge of our land capability through the farm maps and soil tests furnished us by our county office.

FARM PLANS LAY SOUND BASIS FOR GAINS

"We feel that we have increased our farm yields at least a third through the above practices, plus correct fertilizing of our soil. Through building and preserving of our soil and 10 years of breeding and improving our herd of brown Swiss we have also increased our income at least a third per acre and per cow.

"... we are now organizing a community watershed which consists of 6,600 acres. On these 6,600 acres we have a good start on soil-preserving practices which should greatly improve our community.

"We feel that these soil-saving practices will help us to raise our family of four children and make it a better place for them to live in the future."

350 MORE FARMERS SEEK PLANS.—"I live in western Iowa in an area of loess soil that had completely lost its grass cover," writes Don Anderson, Honey Creek.

"Part of it was plowed in the boom times of the first world war, part of it in the depressions of the early-thirties and what little remained, even in fence rows and woodland areas, was completely destroyed in the drouth years of '34 and '36.

"During the next few years following the extreme drouths the rolling land under a corn-oats-sweetclover system of farming the soil was washing away at an ever-increasing rate, gullyng the hill land and silting full the drainage ditches nearer the Missouri River.

"Grass legume mixtures on rolling land, contour farming, terraces and grass waterways, used according to the advice of SCS technicians, were definitely showing that this serious erosion could be brought under control.

"On April 28, 1944 a Soil Conservation District was set up in West Pottawattamie County and soon after that the first SCS technician came to the county. I feel that the organization of this soil conservation district and the subsequent technical assistance have, in less than three years, pointed the way in no uncertain terms to a permanent and prosperous agriculture in this area.

"Possibly I could explain it better by telling of the work that has been done on my own farm. Most of the rolling land has been seeded to brome grass and legume mixture. Cattle feeding is the principal business on my farm. I have found in the last three years that I could feed cattle profitably on that grass. I have also found that by feeding on grass I could get more beef from the corn I raised and have been able to increase from about 200 head to 325 head of cattle fed during the year without buying any additional feed. The production of beef from my farm under what I like to call the soil conservation way of feeding beef cattle from the 1946 crop will be about 40,000 pounds of beef on the hoof greater than the old way of corn, oats, sweetclover, and dry lot feeding. With this grain, I can feel it in my pocketbook and in my rolling land tied so that it can't wash away.

"About 350 farmers that do not have complete farm plans have requested assistance from the district in completing farm plans."

PROGRAM MAKES FARMING EASIER.—"The soil is staying in place on our farm since we have been planting and cultivating around instead of up and down the hills," reports Richard Evans, Urbana, Ohio.

"When my father planted corn up and down the hills (in straight rows) and it washed out and had to be replanted by hand as many as 2 or 3 times a season, I used to wonder if there would be any soil left on the home farm for me when I got old enough to take over myself. I started farming the home place about 14 years ago. The first change I made was from a 3- to a 4-year rotation. This gave us a 50 percent increase in acreage of legumes and grasses and a higher-quality hay. We were not far-

sighted enough to do anything about planting row crops on the level until a soil conservation district was formed in this county in 1944. I was one of the first to apply for assistance. Our soil was surveyed and a cropping program was set up. Having a definite program worked out for a period of several years has made the job of farm operator an easier task.

"Since then we are using more lime and fertilizer, producing more manure, have planted some 3000 trees on submarginal land. Since starting this land-improvement program our income is showing a definite increase."

1500 TREES ON FARMSTEAD.—"Four years ago this June I bought a quarter-section farm located about five miles northwest of here," reports Allen F. Black, Broken Bow, Neb., a cooperator in the New Helena Soil Conservation District.

"Much of the land was worn out, in parts badly eroded, barren of trees around the farmstead and, in general, a typical unproductive and undesirable farm. . . . As a result of this program, mapped out by the Soil Conservation Service and followed by us as a cooperator, we now have an attractive and productive farm.

"Unightly and destructive gullies have been plowed in, smoothed over and seeded to brome grass, we now have two fine pastures, one of cool season grasses and one of warm season grasses, both of which are thriving and to some extent on land which was unsuitable for farming. The farmstead which was barren of trees now has some 1,500 trees of various kinds which will amount to a very satisfactory windbreak and grove within the next year or two."

FARMING AGAINST THE WIND.—"I farm one-half section of quite sandy land in western Battineau County," says Simmon Barlow, Maxbass, N. D.

"This type of land is very subject to blowing and has to be farmed in a conservative manner.

"On my particular farm a soil survey was made and a conservative plan written. In the plan I agreed to farm my land in 10-rod strips against the prevailing wind. Also, the stubble that would ordinarily be plowed under is kept on the surface to keep the wind from blowing the soil. I realize if the land is allowed to be kept black the wind is sure to blow the soil away. When I summer fallow the surface is kept in a trashy condition.

"After the soil survey was made I seeded to grass all of the land that showed it was not good for farming. This will produce some good stacks for feed.

"There was 40-acre field that was blown up to sand dips and with aid of the district machinery these sand dips have been leveled out and the land put back to crop.

"Another part of my conservation plan is to plant 3 rows of trees on the north side of my land to help keep the wind down. I figure if it will keep snow from blowing in the front yard it will keep the sand from blowing too."

LIKE RESULTS OF PLANNING.—"We, the wife and I, own 360 acres and rent 40 acres, which gives us 400 acres," says J. S. Rehaneb, Thurston, Neb.

"On this land we make our home we are trying to save our soil and water to produce food for our family of 10 children and the Nation.

"Three years ago I started to do soil conservation work with the help of the Thurston Soil Conservation District; first we did some contouring of row crops, which was a great help, but found that this was not enough so with the help of the trained men from the soil conservation district, we bladed gullies and started building terraces.

"We seeded the waterways and some land we sowed to

LETTERS NOTE INCREASE IN CROP YIELDS

pasture. We like the idea of soil conservation districts planning the best use of every acre.

"Many of the practices we do with our own equipment, but for big jobs like blading gullies and building terraces we need additional assistance. These practices properly laid out and maintained will be permanent . . .

"Many farmers in this county are getting a good start saving their soil and are seeing its benefit."

LAND RECLAIMED.—"I farm 320 acres of irrigated land in the Wet Mountain Valley," writes Lea E. Adams, Westcliffe, Colo., a cooperator in the Divide Soil Conservation District. He continued, "I have 80 acres of timothy and clover pasture, 40 acres of alfalfa, 60 acres of timothy and clover meadow and 140 acres of plow ground. Four years ago there was at least 30 acres of waste land, covered with willows, and with creek beds winding through it.

"My first project was to pull willows, cut a new channel for Taylor Creek and fill in the old channel, also level the ground on both sides of the creek, thereby reclaiming some of the best land on the farm.

"The second project was leveling and preparing for border irrigation 40 acres of land which we have seeded to alfalfa.

"The third project was straightening Venerable Creek, pulling willows and leveling land along creek. These projects have certainly improved the land and have increased its value several thousand dollars.

"I have increased my yield of timothy and clover hay on 11 acres from the original 10 to 45 tons, by the application of sheep manure, which at the present prices amount to about \$850. I am applying about 500 tons of sheep manure and three tons of superphosphate this year.

"We plan on leveling the remaining 140 acres of plow land as soon as possible. . . ."

LAND VALUES BOOSTED.—"Those of us who have finished the complete farm program as planned . . . have found that we have almost completely stopped erosion. Our land is becoming more fertile and our yields are increasing," reports Albert W. Watson, Wayne, Neb.

"Our local real estate men recognize this and are placing a higher value on farms following a plan of operations as laid out by our local soil conservation district.

"Our highway commissioners tell us that where farms along the highways are following good conservation plans, much maintenance expense is eliminated. Highways and culverts do not become buried by silt every few years and the expense of elevating highways and of digging out and raising culverts is eliminated."

COST OF PRODUCTION LOWERED.—"My son and I own and operate 400 acres," says Howard C. Herald, a cooperator with the Noble County Soil Conservation District, Ligonier, Ind. "Like most farms here in this region," he continued, "the problem of maintaining production is serious. I began operating this farm about 30 years ago and took considerable pride in the fact that I was doing a good job. Now I find that I have wasted large amounts of commercial fertilizer, to say nothing of expensive legume seeds, time, and labor. After all, farmers are not soil chemists and we had been using incorrect amounts of fertilizer. Our use of land was wrong, too, because of improper rotations.

"In May, 1945, M. W. Richman, work unit conservationist and farm planner of the Soil Conservation Service . . . came to our farm and made tests of the soil in each field. He suggested a change in rotations ranging from 3 to 8 years. We had been using a 4-year rotation on

all of our fields. Although he found the fertility relatively high, increased use of fertilizer was recommended. One of the very important suggestions was a program of fertilization of permanent bluegrass pasture. This has increased pasture yield more than 100 percent.

"Our yield of oats averaged about 40 or 45 bushels per acre. In 1946 our average yield was 75 bushels per acre with one field yielding 90 bushels.

"The plan . . . makes the following farm program possible:

42 dairy cattle	1,300 chickens
30 dairy heifers	8 sows
1 bull	an acreage of wheat sufficient to yield 2,500 bushels of wheat for sale each year.
96 hogs	
100 sheep	

"Most of the soil is Fox sandy loam and is inclined to be rather droughty. The legumes and grasses suggested are adding to the organic content of the soil and our problem is being minimized.

"We find that we are experiencing no addition in operating costs; in fact, our per unit cost of production is decreasing."

CROP INCOME INCREASED.—"The half day required to work out this plan for my 60-acre farm in the spring of 1941 was the most profitable time I have ever put in on my farm," says George D. Hawkins, Hartsville, S. C. "I estimate conservatively that it has given me an increased income of at least \$1500 on soil conserving crops alone. That does not include the value of the soil that has been kept from washing and blowing away, nor the increased yield that has come from the soil-building practices which I am now following as a result of the plan. This \$1500 additional income was from new crops—at least new to me—which I would not have planted otherwise, and on land that was bringing low returns or none at all.

"I had one steep area of two and a half acres that was a real problem. I planted it to sericea lespedeza, and since 1942 it has produced 3 tons of hay and 3,000 pounds of seed worth \$700. Another field of 3 acres of sand was planted to kudzu and yielded 12 tons of hay worth \$400. 1 acre of washed-away land was planted to lespedeza bicolor, which has brought me \$75 from seed. Still another 3 acres, which was so completely washed away that I had "turned it out," was planted to kudzu. This land was so worn out that the kudzu has just now, after 5 years, developed to where it will furnish some grazing or hay. This land had completely stopped producing, so anything I get from it is profit.

"Blue lupine, one of the new crops in this section, is turning out mighty well for me. I got interested in this crop in 1944, when the Pee Dee Soil Conservation District gave me enough seed to plant two acres. I had bad luck with it that year but in the fall of 1945 I bought enough seed for 4 acres and planted it in October, after innoculating it thoroughly. I plowed under two acres for green manure and left the other 2 to produce seed.

"By terraces, contour cultivation, and rotations containing lots of soil building crops—practices included in the plan—the amount of cotton I have produced on the same acreage has increased 1250 pounds of lint per year, worth approximately \$400. My tobacco yield has increased 1800 pounds a year, amounting to \$700.

"Improved drainage on a 6-acre bottom increased its yield of oats and corn by at least 20 percent.

TEN PERCENT INCREASE PER YEAR.—"I have been pruning in this orchard for the past several weeks and have been cutting off new wood that actually runs as high

DISTRICT FARMERS BUILD SOIL AND INCOME

as 6 feet," says W. P. Leavitt, Placerville, Calif., in speaking about the results he has obtained from a permanent cover crop established 4 years ago in his orchard that has some grades as high as 33 percent. "The production of this block has been increased about 10 percent each year since we put the cover in and, even with a heavy crop last year, the bud set is again 100 percent. We have, of course, used a lot of fertilizer on the entire place. However, the present excellent condition of this orchard is due entirely to the benefits of the permanent cover crop. We flood irrigate, there has been no erosion, and the condition of the soil and trees is improving as each day passes.

"The production in 1943, from this six-acre orchard, was 1,116 lugs of pears. In 1944, it was 1404 lugs, and in 1945, it was 1,227 lugs. The drop in production in 1945 was due to a heavy infestation of pear blight. In 1946, I had 1,553 lugs on this acreage, and from the set of pear buds, indications are that there will be a very heavy crop next year. In addition, I made two cuttings of approximately 7 tons of hay from the permanent cover crop, and have been able to pasture from 2 to 7 head of stock on the area after the crop has been harvested."

GOOD ENGINEERING SAVED SITUATION.—"Our five farms lie in a dish-shaped basin," says Herman Lovengen, Arlington, Wash., in talking about "licking a common drainage problem of mine and my neighbors."

"Although our soil is very good, we were held back in our farming operations as there was not a suitable drain leading from the basin and the winter rains made a lake on parts of our farms.

"All of us got together with your engineers and we asked their advice. Of course several months went by before we could all agree on how to do the job. In the meantime the Soil Conservation Service men helped us draw up right-of-way easements to run with the land and we had them signed, notarized and recorded. Part of our trouble had been lack of right-of-way, so we appreciated the help in getting the easements ready.

"When at last we were ready to dig our ditch we struck trouble. The engineers specified an 18-inch concrete tile line 600 feet long to run from the basin through high ground, with a 14-foot cut to Portage Creek, which was our outlet. Some of us didn't believe such large tile was necessary and wanted to install 12-inch tile. The engineers refused to give in and insisted on 18-inch tile. They put up a good argument and we finally did the job as they had planned it.

"We finished the system in September. In October the Stillaguamish River went on a rampage with the highest water we had ever seen in the Valley. It overflowed the Valley and filled our basin so that we had a 65-acre lake covering parts of our 5 farms. We realized then that if the engineers had not insisted on the large tile, our winter seedings would have been lost before the water drained away.

"My winter cover crop is now a bright green and 4 inches high. It would have been lost without the drainage job. The difference in production in my cannery pea crop last year would almost have paid for my share of the cost of the new drainage system, if it had been put in a year earlier."

DID ALL WORK HIMSELF.—"For the past 8 years I have been cooperating in the soil conservation work in this district," reports J. C. Buford, Prescott, Ark., who operates a 145-acre farm.

"When we bought this farm in 1936 it was run down and in mighty bad shape. The gullies were bad, fences down, and much of the land had been left out to grow up in weeds and brush.

"We made our first crop on the place in 1937. We made 3 bales of cotton on 23 acres. Corn turned out about 8 to 10 bushels per acre. The pasture didn't furnish enough grass for our 4 cows and calves. The next year we signed up with the soil conservation work . . . We worked out a plan on what needed to be done. Since then they have helped me get this plan carried out. We terraced all of the cultivated land, amounting to about 4 miles of terraces. Most of this was done with 6 mules hitched to a grader. Some of the gullies were so deep that the grader would almost turn over in them; now you can't tell where the gullies were.

"The pasture was contoured and set to bermuda and seeded with lespedeza and clover. I planted 16 acres of lespedeza and 2 acres of sericea for hay. I began planting vetch and winter peas, and laid off my rows with the terraces instead of up and down the hill. Now I make about 375 pounds of lint cotton per acre and 25 to 30 bushels corn per acre. Last year I made 7 bales on 9 acres and some of the bales weighed over 600 pounds. I make on the average 1,000 bales of lespedeza hay and last year cut 102 bales of sericea on 2 acres.

"My pasture now carries 25 to 30 head of stock from April through November and they go through the winter in good shape with only a little hay and no grain. I have noticed the water stands from 10 days to 2 weeks longer where the pasture is contoured.

"When we started on this place we had to buy all our hay and part of our corn. Now we have hay to sell and plenty of corn.

"I started this work back when money was scarce, and have done all the work myself except for part of the terracing. We have built a new house and barn, have electricity and a water system. It takes work but I know from experience that it can be done and that it pays."

TECHNICAL ASSISTANCE LOWERS COST.—"I am a farmer and have three farms under agreement with the Yellowstone Soil Conservation District," writes Gus Steinmann, Ashton, Idaho.

"Land leveling has been a part of the program outlined in my plans. The leveling that has been done on parts of my farms has increased the value of the farm by at least 10 percent to 15 percent. In addition to that it has made it possible to increase yields, and the quality of the potatoes especially, by at least 25 percent. Besides all of this, I have been able to handle my farms with lower labor costs. If it hadn't been for the technical assistance supplied by the Soil Conservation Service most of this work would never have been done.

"This coming year I am renting two of my farms to two separate farmers. Each of my renters have agreed to operate the farm as agreed on in the conservation and land-use management plan and this plan will automatically require the tenant to farm in such a way that the farm will not be run down."

EVERY FARM NEEDS COMPLETE PLAN.—"I am using every acre according to its proper use," says Willie Kouba, Yukon, Okla.

"My conservation work has increased the value of my farm at least \$1600. In fact, if I hadn't fixed my place up, part of it couldn't be farmed today.

"When I bought my farm there wasn't any pasture. The fields were washing bad. Part of it was washing so I couldn't farm it with a tractor. . . .

"I think the way I have taken care of and improved my land has really paid me. Every farm should have a complete conservation plan so we can save the land for our children."



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≡ SOIL CONSERVATION ≡

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WELLINGTON BRINK

Editor

Art Work by

W. HOWARD MARTIN

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COMEBACK OF FARM.—"Like other farms in our territory, ours was cleared from the forest by the first white farmers and immediately was subjected to all the bad farming practices that an unenlightened agriculture could devise," writes James Conner, Belle Center, Ohio, in relating his experience in rebuilding and reclaiming his farm.

"In less than one hundred years," he continued, "it was abandoned as an unproductive unit. I came into possession of the farm by purchase from the administrator of the estate in 1938. I remember yet the open naked gullies, the barren slopes where sheet erosion had taken away most of the topsoil, the rusty and broken fences and dilapidated buildings that an impoverished farmer had been unable to replace. Immediately I sought the assistance of the Soil Conservation Service. The entire order of bad agricultural practices was changed, we terraced where terraces were needed and strip cropped where strips were needed. We set 20,000 trees where the land was best suited to forestry and adopted the practices of pasture and crop

(Continued on page 80)

FRONT COVER.—Elvin Z. W. Compy, husky technician of the Soil Conservation Service, is seen examining the texture of a soil sample just taken with his auger on a farm in Prince Georges County, Md. His inventory, recorded on the aerial map, is basic to farm planning. All over the United States such samples are being taken every day, for soil conservation requires that land be used according to its best capabilities. All soil conservation practices are founded on a knowledge of



physical factors such as soil types, slope, character and degree of erosion. Present land use, economic and social conditions, and farmer preferences also are taken into consideration. This fine photographic study, made right in the field, is by Hermann Postlethwaite.

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By J. A. Killough

20 Acres

HIS FARM boundaries have remained the same for 18 years, but you might say that Cicero Abernathy has doubled the size of his place during that period. That's because he's making 1 acre do now what it used to take 2 acres to do.

Abernathy is a Negro farmer who lives just outside the little town of Okay, Okla., in the northeast part of the State. His home farm is just 20 acres big. But he makes a living on that 20 acres. A good one. He raises truck and beef and pork and seeds, and this year his income is going to be right around \$3,000 on the place.

The little farm hasn't always been so productive as it is now. "It was in fair condition when I moved here 18 years ago," says Abernathy. "I averaged around one-half bale of cotton and 20 to 25 bushels of corn per acre. But I began to see that it was washing some in those crops, so I changed over in 1933 and went to truck farming to make a living."

"Strawberries, you might say, have always been my leader. I have an acre and a half of strawberries. Another half acre of the berries is coming into production next spring and still another half acre the spring of 1949. Watermelons are second leader. Then, I raise cantaloups, lima beans, tomatoes, blackeye and cream crowder peas, okra, corn, sweet peppers, and once in a while mustard and some spinach."

NOTE.—The author is district conservationist, Soil Conservation Service, Claremore, Okla.

Abernathy pays off, as each box is delivered; 5 cents cash per box picked.

Abernathy began making a better living when he switched from cash crops to truck farming, but that soil washing he'd first noticed in 1933 kept up. By 1939, though, the erosion was beginning to take a real toll. Two or three fair-sized gullies were showing up. Abernathy decided to see the supervisors of the local soil conservation district. He went into Wagoner, headquarters for the Verdi-Grand Soil Conservation District, and applied for assistance in soil conservation work. A technician of the Soil Conservation Service working there went over the farm with the owner. Together, the technician and Abernathy worked out measures to control the erosion, build up the fertility and still fit right into the pattern of truck farming.

One of the first things done was to build a terrace outlet. When the sod on that spread enough to hold water without danger of washing, the terraces were rebuilt and enlarged. Later, weeping lovegrass was planted on each terrace. To restore fertility and productivity to the soil, Abernathy began to haul corn cobs, cotton burs,

manure, straw and everything else he could find out to the fields. "Never take a load of truck to town I don't bring back something for the land," he puts it.

Now the farm has pretty well been covered with this treatment, which serves to build up the organic matter in the soil. "The soil is full of organic matter and it's fluffier than it was. It'll hold rain 10 to 15 days longer now than it used to. That helps when a drought starts in," says Abernathy.

For a winter cover crop to protect the soil against the beating, washing rains, Abernathy uses ryegrass on half of his 20 acres every year. The ryegrass gives him some grazing for his cattle, and like the cobs and burs and straw, adds organic matter to the soil when it is plowed under in the spring. The pea vines get plowed under, too. They put both organic matter and nitrogen in the soil.

Here is how the 20 acres stack up financially. The acre and a half of strawberries made \$830 this spring. The truck crops, sold by Abernathy from his pick-up truck on the streets of Wagoner and Muskogee, bring in \$1,050. The weeping lovegrass on the seven terraces on the place—about 2 acres altogether—brings around \$600 a year. That's sold as seed from \$3 to \$4 a pound. Weeping lovegrass is an excellent pasture grass which is in great



The tall grass waving off into the distance is one imported from Africa. Weeping lovegrass is used by Abernathy to keep his terraces from washing. He also cuts a valuable seed crop from the grass.

demand in the Western Gulf region. It's a fine erosion control crop. Two crops of hogs which feed off unsold truck, some pasture, and a great many odds and ends, bring \$500. And 200 quarts of fruits and vegetables canned every year for home use come in for consideration. Added up,



Both beans and cabbage need the weeds chopped out, so Cicero and his wife take hoes in hand and do the job.

that makes a total of better than \$3,000 income from the 20 acres.

Working that 20 acres might be enough for one man, but it isn't for Abernathy. He's practically through farming at home every year by fall. The rest of the year could be spent at leisure, but it isn't. Abernathy, being available in September, October, and November, gets steady employment hauling cotton and other crops for his neighbors. He spends time throughout the year on 20 acres which he has rented. Corn is raised there.

Three years ago Abernathy bought 60 more acres half a mile north of his home place. That's being developed as pasture. He has sown lovegrass on the terraces and ryegrass on the rest of it. Two tons of lime have been put out on each acre. There's already a good base of Bermuda grass on the land.

Abernathy's going to add yellow hop clover and lespedeza to that. Right now there are six brood cows running on the 60 acres. Abernathy sells baby beeves. Last year he sold five of the calves at \$65 each. The grasses and legumes in the pasture are just reaching full growth this year. It is planned that the 60 acres will support 12 cows most of the year when the improvement work is all installed.

"In the past 6 or 8 years we've at least doubled what we can make on our 20 acres," says Abernathy. "And we're building up the 60 acres. It's going to make us more and more as we improve it. We haven't reached the top on that pasture place, and we haven't on the home place either. The soil conservation things we do, keep building up benefits. All our yields can still be raised."

DEATH OF E. C. McARTHUR

NEWS of the tragic death of E. C. McArthur on September 8 came just as this issue of SOIL CONSERVATION Magazine was going to press. Mr. McArthur was president of the National Association of Soil Conservation Districts. (See the July 1945 issue, "South Carolina's McArthur.")

His was a loss that can never be made up. The whole program of the soil conservation movement in America was being tremendously aided by the efforts of this zealous and able leader. Being a farmer in that part of the country where erosion has wrought great havoc, the danger of the process to the very life of our Nation was thoroughly understood by him. He was a man of such thoroughgoing loyalty to his country that his whole being was consumed with a deep sense of the urgency of what needed to be done. Moreover, he had the energy, the imagination, the willpower, and the fortitude to speak out in the interest of farmer, community, and Nation. His efforts were ceaseless, invaluable.

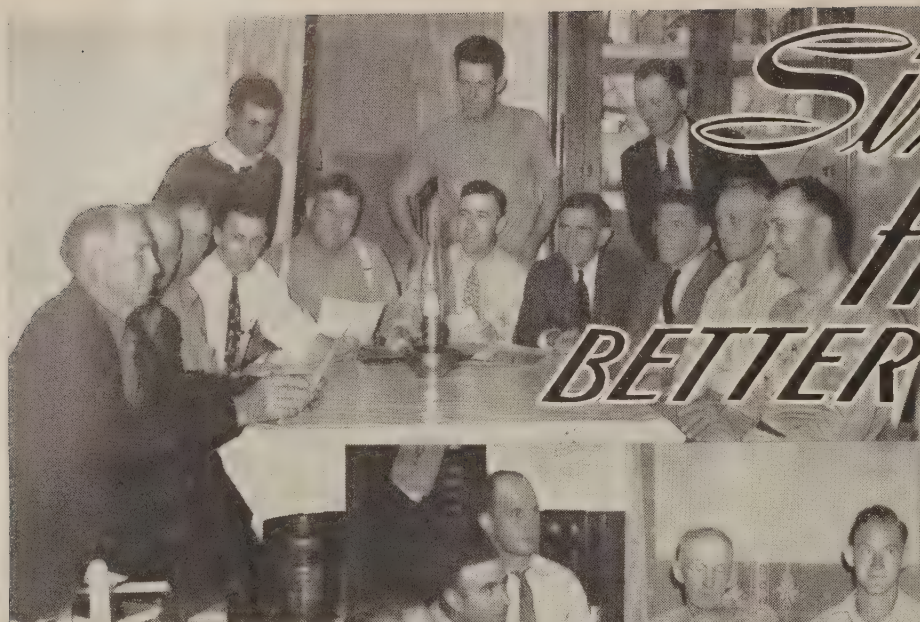
He was held in high esteem and affection by all of us. Always we will be missing him.

—H. H. BENNETT



The late Mr. McArthur

Six or Eight Heads BETTER THAN ONE



A group of West Fork Soil Conservation District farmers discuss local program. Reading clockwise around table: Earl Furby (standing), T. L. Straley, president of Lewis County Farm Bureau; E. D. Bennett, Glendon P. Burton, Jr., R. M. Hartley, West Fork district supervisor; C. M. Francis, Forest Hitt, and John L. Burn-sides.



Left.—Seated in home of M. O. Miller, on Cedar Creek, is this first group of neighbors in Gilmer County organized to wage war on erosion. Seated: Howard Walters, Homer D. Furr, W. H. Bragg, M. R. McClung, county agent; M. O. Miller, Glendon P. Burton, Jr., soil conservationist; Fred Whiting, J. J. Massey, Fred Furr and Russell Reed. Standing: B. F. Frederick, Tommy Reed, and L. K. Grover.

By Glendon P. Burton

WITH THE NATIONAL budget whittled to the bone and with 15 to 20 new districts coming in each month, it takes no master mind to see that soil conservation district governing bodies and we technicians of the Soil Conservation Service will have to cover more territory at a faster pace. That raises a question: Can we get conservation practices on more and more acreage without sacrificing the quality of work?

That is a tough question, and I don't profess to have all of the answers. I would like to suggest, however, that we might give more attention to the group approach to form conservation planning.

Four years ago, group planning began in the West Fork Soil Conservation District of West Virginia. It was undertaken for three reasons: First, Ivan McKeever, who was then a zone conservationist, gave me the outline of a plan that he thought would work. Second, we were fairly sure that the average farmer didn't have sufficient knowledge of land-use capabilities to appreciate

fully the services of a farm planner. And, third, we believed that the district would have to reach a good many people in a fairly short time if conservation work were to get ahead of the soil losses taking place in the district.

We realized, of course, that the group approach to farm conservation planning was not a new idea. Other districts had tried it with success. My only reason for writing on this subject is that others might profit by a few of the West Fork District's experiences—and perhaps avoid some of its mistakes!

The group approach was started in a new area just after it had become part of the district. For that reason, the governing body thought that the farmers needed a good deal of basic information on conservation planning. So, after a group of 6 to 10 farmers got together, they usually held 6 meetings. Each one of them lasted about 90 minutes.

At the first meeting, farmers and farm planner gathered about the dining table in the home of the farmer who had shown the greatest interest. We discussed the economic need for conservation planning and farming. Then every farmer was

NOTE.—The author is work unit conservationist, West Fork Soil Conservation District, W. Va.

given a chance to sign a district agreement form.

At the following five meetings, we delved into proper land use, crop-land practices, pasture practices, woodland practices, and the duties of the conservation aid. I had a lesson plan to serve as a guide in each discussion, and also made sure that we had soil capability maps for each farm. In between the meetings, each farmer developed a conservation plan for his entire farm with the help of district technicians.

As the farmers of the district learned more about soil conservation and as technicians gradually developed more skill in working with groups, much of their discussion of basic information was eliminated and the number of the meetings was reduced. With each passing month, there was more demand for the services of a farm planner. The number of hours spent on discussion was decreased and the time spent in the field was increased.

After 4 years a system has evolved that seems to get results. It begins when a farmer comes to the district office to ask for help. Just what prompted him to come is sometimes difficult to know. It may have been a news article, a radio talk, or a few words spoken by another farmer. But, anyway, when he comes in, he is asked the names of four or five of his neighbors. The farms of these neighbors are then located and outlined on an aerial map.

When the farmer leaves, he has agreed to invite his neighbors to a group meeting. In the meantime, plain aerial maps and conservation survey prints are ordered.

When the aerial photographs arrive, the farmer is contacted and arrangements made for a meeting—usually at his home. Whereas at first six meetings were held, the practice now is to hold two 1½-hour meetings or one 3-hour afternoon meeting.

Let us suppose that two evening sessions are held. At the first, the leading farmer explains why we've come together and introduces the farm planner. This is the cue for discussion of land use problems in the neighborhood. Maybe these are listed on a blackboard: (1) Broom-sedge, (2) gullies, (3) low yields, (4) poor stands, (5) labor scarcity, (6) wet land, (7) crooked streams, (8) getting to land on top of hills, (9) steep land, (10) diseased trees.

The list need not be complete. Just put down what the farmers suggest. Try to get everyone

to think of the community and not of any particular farm.

Then we begin another list—the solution of these problems. This may take in such items as lime, fertilizer, mowing, reforestation, diversion ditches, strip cropping, contour cultivation, drainage, fencing cattle out of woods, and so on.

At this point, everyone's remarks are summarized and it is explained that there are six classes of land in the area. Each land class, it is noted, has certain capabilities, as do machinery, people, and livestock. It is announced that these land classes will be considered at the next meeting. Sometimes conservation survey prints are brought out, sometimes not.

At the beginning of the following meeting, the previous discussion is quickly reviewed. Then attention is drawn again to the blackboard, where four columns are listed: land classes, characteristics, most intensive use, and practices. The first two columns—land class and characteristics—have been filled in before the meeting began. The farmers are asked to help complete the last two columns dealing with land use and needed practices.

When we've finished, the outline may look something like this:

Class	Characteristics	Most intensive use	Practices
I. Green.....	Level, well drained, good soil type.	Row crop every year.	Lime, fertilizer, cover crop.
II. Yellow....	Level, imperfectly drained, medium to good soil type	-----do-----	Drainage, adapted seed mixture.
III. Red.....	Gentle sloping, medium to well drained, medium to good soil type.	3-year rotation	Contour cultivation. Strip cropping, diversion, sod waterway.
IV. Blue.....	Sloping, medium to well drained, medium to good soil type.	Long-term hay.	Long lived grasses, crop residue management.
VI. Orange....	Steep, good to poor soil type.	Pasture.....	Lime, phosphate, mowing, pasture management.
VII. Brown..	Very steep. Good to poor soil type.	Trees.....	Protect from fire and grazing, harvest mature trees, remove weed trees, borders.

By this time, most farmers are able to nail the practices to their own farms, acre by acre. They have the background of knowledge and the desire to go ahead with a complete soil and water conservation plan. Now it's only a matter of making a date with each farmer—and going to his place to plan the farm. At present, farmers do not sign agreement forms until their conservation plans are completed.

COMEBACK OF FARM

(Continued from page 74)

There are certain outstanding advantages to the group approach. First, it cuts down travel time for technicians. Second, most of the story can be told to several farms at the same time. Third, it enables the farm planner and the farmer to do a sounder job of planning. Fourth, it provides a systematic plan of procedure.

Group planning sells conservation to neighbors. This helps to prevent the possibility that an uninformed neighbor may unsell a prospect. In fact, it has the reverse effect: As farmers continue their discussions across the fence line, they become more convinced of the soundness of conservation farming.

Luckily, the help of a county agent who believed in conservation work was also available to the district. M. R. McClung, former county agent of Gilmer County who is now agricultural representative of the Monongahela Power Co. at Elkins, W. Va., helped spread the gospel of group planning.

From March 4, 1944, to March 4, 1947, 300 farms averaging approximately 150 acres each were planned. That's an average of 100 farms each year. I am told that this is a fairly good record. (Editor's note: This is an amazing record. The Northeastern States average for each farm planner last year was 28.8 farms, covering 4,271 acres; West Virginia average, 44.2 farms, covering 6,238 acres; and national average, 31.2 farms, covering 8,228 acres.)

The district can't rub an Alladin's lamp and get my every wish. Neither can some magic words be mumbled and be sure of success. I believe the district's experiences do, however, emphasize two principles:

(1) The district governing body and assisting technicians and county agent must first sell themselves on group action. They must believe in it, or no one else will.

(2) Develop a plan of approach applicable to the district and use it. Group approach to farm conservation planning varies with personalities, places and conditions.

As a final word, I might mention that we all felt mighty fine when the supervisors of the West Fork District thought through the group approach plan and adopted it. Once deciding upon it they simply passed a resolution adopting the group approach and since have participated in using it to help farmers get the maximum effective conservation on the land.

land improvement by liming, fertilizing and legume seedling. Immediately the land responded to care.

"Today in the short space of 9 years we have regained much that had been destroyed. Each year we have seen an improvement over the year before. Each year the bushels per acre in wheat and oats, the tons of hay per acre, the pasturage per animal unit have been higher. Each year we have seen the income in dollars and cents rise. In these years we have seen this farm pay back its original cost, the cost of the land improvement and the cost of building and fence improvements. Today we have a productive unit capable of supporting a 30-cow dairy with a production of 300,000 pounds of milk per year.

"From this beginning has sprung up the largest solid block of land in Logan County to be put under a soil conservation agreement. This block of land is 4 miles long with 1400 acres of land and 11 different owners. Of course this is only a fraction of the land in the area. Fifty or more land owners with probably 5,000 acres of land are still outside of a soil conservation agreement. This land is largely marginal land that responds readily with care and all could be made into a real producing unit."

WHOLE COMMUNITY BENEFITS.—"The production on my farm and neighbors' farms has more than doubled in the last 10 years," says Lon E. Reid, Ward, Ark.

"Since we have changed from the one-crop system, which was cotton, we have learned to rotate our crops, improve pastures, meadows and woodlots, grow soil-improvement crops, and as the result of this we have dairy cattle and today practically every farm in my community is on a cash and profitably-operating basis.

"We have been able to improve our homes, to have modern conveniences, to have better schools and churches. To just give you a better idea of how prosperous my community is, in 1946 we bought, hauled and spread gravel on approximately 25 miles of farm and market roads . . . Instead of our soil getting poorer under the one-crop system, as it was doing, it is now improving and production is gradually being increased each year. We, as farmers, feel that this is in a large measure due to the assistance that is being afforded us through the Soil Conservation Service.

"I personally feel and am sure that my neighbors feel the same way I do, that the district program is the best method of carrying on soil conservation work."

BEST BLUEPRINT EVER SEEN.—"I had a plan written for my farm about two years ago, and I think that it is the best guide or blueprint by which to carry out farm operations that I have seen," says L. A. Long, St. Paris, Ohio.

"The whole system is a sound, grass-rooted principle, whereby you are attempting to show the farmer his problems and then assist him through your Service personnel, how he can improve or at least hold his own, in this critical situation of land waste. I think that it behooves us, one and all, farmers, business men, banker, or laborer, to get more soil conscious or soil minded! And wake up to the fact that only from the soil does he exist or prosper.

"This is my way of having you know that I think by having more of these plans written throughout our land, more and more people will look over the fence and see the benefits cooperators are receiving through the Soil Conservation Service."

Will SCS technicians who can speak fluently one or more foreign languages and who might be interested in foreign assignments please write, giving particulars, to William X Hull, Foreign Liaison Representative, Soil Conservation Service, Washington 25, D. C.

YIELDS RESPOND TO GOOD CARE OF SOIL



Onions being harvested on Wunsch brothers' farm.

SIXTEEN YEARS of attentive care for the soil have brought fabulous crop increases to two farming brothers of Colorado—Christian and Fred Wunsch.

The brothers began farming for themselves in 1930, when they bought 100 acres of land near La Junta. They paid only a small down payment for their farm, and the land was not very productive. It was raising an average of 9 tons of sugar beets to the acre.

But the Wunsch brothers had learned a lot working for other people. They had had much time to think while they were down on their knees weeding beets. When they became landowners, it wasn't long before they began leveling their new land, changing field boundaries, realigning ditches, and improving irrigation methods. They spread barnyard manure and commercial fertilizers, and

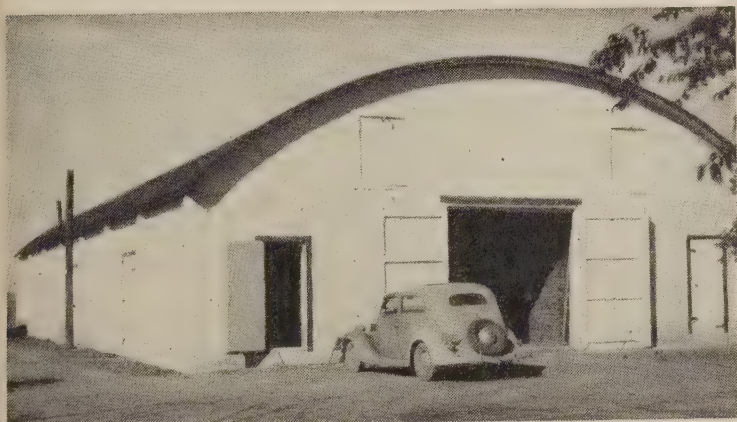


This modern duplex of the Wunsch brothers reflects the up-to-dateness of their farming methods.

grew green manure crops. They consulted the county extension agent, the Agricultural Experiment Station at Rocky Ford, the Bent Soil Conservation District, and the Soil Conservation Service technicians. They went in for study, experiments, and record-keeping.

After a few years of hard work, yields on the Wunsch farm began to increase. Crops were rotated, and more land was added to the original acreage. Today the brothers own 290 acres and lease 35 more, which they are improving year by year. The Wunsch brothers themselves did all the improving they could. They leveled the land where a fresno and float could do the work, and called on the district for technical assistance and heavy equipment when the problem became too big for light equipment. They studied the land capability and conservation needs on each acre.

Only two small sheds now remain of the jumble of shacks acquired with the farm. The place now



A new warehouse built recently by the Wunsch brothers.



Plastic siphons keep irrigation water under control. The irrigation head is just large enough to fill the head ditch and furrows without overflowing. Equalizing basins are used to help control the amount of water in the furrow and to prevent erosion.

has modern buildings, including a storage shed with a capacity of 130,000 bushels, which replaced two old boxcars. A second warehouse of even greater capacity has just been completed at the railroad yards in La Junta. Pump irrigation now supplements the ditch water, and when water is needed it is available.

The Wunsch brothers like to tell about one 45-acre field they bought which was cut up into 11 different fields, each surrounded by a dike which prevented the waste water from escaping when the fields were irrigated. This piece of ground has been turned into a single, level field, well-drained, and all irrigated in one direction.

But the farm records on yields tell the story that makes all this preparation significant. After being worked over, one 24-acre field produced enough potatoes in one year to pay for the land,

the leveling, fertilizing, and other operations. The cost was about \$5,000. Production of onions increased from 400 bushels per acre in 1934 to a peak of 1,450 bushels in 1942. Sugar beet production jumped from 9 tons per acre to a record high in 1941 of more than 29 tons. Last year the farm produced enough beets to make 60,000 pounds of sugar. Cantaloupes reached an all-time record of 1,450 marketable melons per acre last year. The total onion production on the farm has risen from 1,600 bushels in 1934 to 88,000 bushels in 1944. Grain and alfalfa are grown for green manure crops, which are incidental to the raising of the four main crops—cantaloupes, onions, potatoes, and sugar beets.

Dwight S. Waters, district conservationist for the Soil Conservation Service in the Lamar area, says that this remarkable record is the result of



Good furrow irrigation like this has made the Wunsch brothers successful farmers. The furrows are of uniform gradient, spaced evenly so that the water will seep and meet under the beds. Careful furrow irrigation permits soaking the root zone without wetting the surface, thus avoiding puddling on the surface and germination of weed seeds. The water is skilfully applied and its movement into the furrows controlled so that it fills the furrows properly.

hard work, study, experimentation, and good farm management.

"The Wunsch brothers take care of the soil," he says, "and the soil responds. They add humus, drain fields, level land, add fertilizer and keep records. They are constantly improving their irrigating methods."

When congratulated on the fine record of the farm, Fred Wunsch commented, "Well, we may not get rich off this farm, but we will at least pass it on to someone else in better shape than we found it."

The brothers recently received the W. G. Skelly Agricultural Achievement Award.

SAVE THE SOIL AND SAVE ALL

By John A. Cleaton

IF YOU LOOK at my topic, "Save the Soil and Save All," from any angle, you must admit that civilization is based on just 6 to 8 inches of topsoil. If we should lose this topsoil, civilization on this earth would cease to exist.

The history of civilization is a history of the exploitation of the soil. When soil becomes depleted and infertile, it ceases to be soil and becomes "dirt" that washes and blows away. The great cities of Central Asia, from which our ancestors come, are now buried under wind-blown sand and soil.

NOTE.—John Cleaton was graduated from the LaCrosse, Va., high school in June 1946, and is now farming. He made this talk in the annual public speaking contest for vocational agricultural students when he was in school, and later repeated it at a meeting of the Virginia Association of Soil Conservation District Supervisors, at Lynchburg, Va. His father is a cooperator of the Southside Soil Conservation District.

There is no virgin soil. Civilization has come to a standstill. It must perish where it is or learn to rebuild soil that has been depleted by wasteful farming methods. Methods that have been advocated by the Soil Conservation Service can be used to restore worn-out land and to produce much greater crops than we have ever heard of being produced by the old system.

Recently I was talking to a colored farmer about soil conservation. I told him that healthy people could only remain healthy on fertile soil and that worn-out land made unhealthy, no-account people. "That sure is a fact," he replied, "the good Lord cannot make fine people out of poor dirt. He has to use so much poor yellow clay subsoil now that He has to put lampblack in it to give it a healthy color."

On December 5, 1945, the members of the La-Crosse Future Farmers of America attended a

hearing in the South Hill school on the Roanoke River flood control and hydroelectric project. This project is to cost the Federal Government \$38,000,000. It will produce 442,000,000 kilowatts per year of electricity. I sat and listened to the army engineers explain that over a period of the last 50 years each succeeding flood became a little worse until 1940 when three lives were lost and a \$5,277,500 property damage caused. Also, after the flood water receded, the mud deposited on the river low grounds contained so much poor clay that the river bottoms were no longer productive as they once were.

As I heard this I began to think how different the Roanoke River was in 1728 when Col. William Byrd was surveying the line between Virginia and North Carolina. He said: "The Roanoke River is a beautiful crystal-clear stream full of trout and other fish." Yet, not one person within the sound of my voice has ever seen the Roanoke River when it was clear. Day after day it flows toward the sea carrying with it just a little more of that topsoil upon which civilization depends.

It I attempted to speak here today about the national soil conservation program, it would be a lot of high-sounding words signifying nothing. Rather, I must confine my speech to my efforts in conserving the soil on my home farm—that my small effort will aid in making up the national program.

The first effort to conserve the soil on this farm was to terrace the fields so the water would run off slowly. I have seeded lespedeza mixed with herdsgrass on by fields so nitrogen and other plant food elements will not be lost during the winter months when the lespedeza plants are dead. I try never to let a field go through the winter without some green cover crop on it. Many of these cover crops I use as green manure crops.

I am just beginning to take advantage of strip cropping and contour tillage. By this method I hope soon to be able to cut down on the number of terraces in my fields. It is my dream to be able some day to sit on my porch at home and look across the pasture at the big field. The big field contains 30 acres of land on a hillside. What a beautiful sight my contour strip cropping will be, but the best of all, I will be holding my topsoil on the hillside, and the little stream at the foot of the hill will always be clear—my contribution to saving the soil!

Last year our agriculture teacher handed me a

farm magazine and asked me to report on "kudzu" the next day. I didn't know much about kudzu as a soil-conserving and land-building crop, for this was my first acquaintance with it. Later, H. M. Collins, district conservationist of the Southside Soil Conservation District, visited our school and told us more about kudzu. He also told me where I could secure some crowns for my farm.

In trying to convince the members of my class of the many advantages of kudzu, I convinced myself. My section of Virginia is often hit by floods. The mud deposited by the flood water makes the grass on the low grounds unfit for pasture. It was then that I began to hear about people who had fields of kudzu on their farms. Although these fields had carried the cattle during the summer months, they were again called upon to feed them during the fall months. I find it was a crop which will grow on poor land, will check erosion, and build soil fertility.

The crowns that I secured were planted for pasture on a field which is too steep to grow row crops profitably and very little grass will grow there. I have cut off this field from the rest of the pasture until my kudzu can get a start—so if you want to see the benefits of kudzu, come to see me about two years from now.

For years I have noticed that fields which run to the edge of woods will not grow crops and every year we had to cut the bushes back from the field.

Also, this land would wash badly, thus adding more topsoil to the river. Now comes another soil-building crop that will solve this problem and also give other benefits. This crop is sericea lespedeza. Sometime ago Will Jeter, III, of the State Forestry Service, brought enough sericea lespedeza for each member of the F. F. A. to plant along the edges of the fields. I find this crop will grow under shade, will stand dry weather, and is a good hay crop if cut at the right time. It produces a cover for birds and also furnishes the birds with food.

Seeding pasture, and the use of lime and phosphate, are two of the practices from which I am receiving real benefits.

I have nice timber on my farm and it is my desire to care for this timber in such a way that it will be a forest crop. Last year I planted 1,200 loblolly pine seedlings given me by the Soil Conservation Service.

(Continued on page 95)

SAVE SOIL ON RENTED FARMS

By I. W. Arthur

"How can soil loss and depreciation be controlled and reduced on rented farms?"

WITH SURVEYS showing greater soil losses on rented than on owner-operated Iowa farms, this posed a big question for the State soil district commissioners.

Their problem boiled down to this. For a tenant to become aggressive in soil-conserving and soil-building work, he must have assurance of one of two things: either that he could stay on the farm until he had realized complete returns and some profit from any investment which he had made in soil conservation practices, or that he would receive fair compensation for any unused values remaining in his soil-improvement program in case he left the farm before gaining full returns.

Several aspects which retard the rapid adoption of soil-building and soil-saving practices on rented farms, had to be considered.

For instance, many of the practices are relatively new to farmers in the State of Iowa. There is no established custom which the owner and tenant could follow in determining the contribution each should make when establishing a good soil management practice. The tenant must be sure that he will be paid for any practices that he can't cash in on. There is a lack of any simple method by which owners and tenants can easily reach and record their agreement with no danger of misunderstanding.

To meet these needs, the first essential is that the owner and tenant agree to a systematic plan for saving and building the soil. Once they agree to work together, they can use the lease "rider." This rider, evolved by farmers, conservation officials, and Iowa State College extension people, working together, was first suggested by farmers and their soil conservation leaders in Mills County, Iowa. The rider was designed to be hooked on the tenant's existing farm lease. It would encourage him to become conservation-aggressive by assuring him of fair compensation for any unused soil-saving and soil-building investment in case he had to leave the farm before realizing his full return.

The rider achieves its objective through the following simple steps: First, the soil-building and soil-saving practices which are to be started on the farm during the year are listed. Second, the contributions to each practice which will be made by the owner and by the tenant are agreed on. Third, estimates of the value or cost of the tenant's contribution to each practice are made. Fourth, the compensation due to the tenant for unused value if he leaves the farm before he has had full return on his investment is set and agreed upon.

Now for the pros and cons of the plan.

If an aggressive soil-conservation program is to be carried on, the tenant is the one likely to do most of the work. The main purpose of the rider is, therefore, to get the tenant to participate in soil-building and soil-saving practices. But, if the landlord is slow to come around, the tenant has an impersonal plan and form with which to approach the landlord and make him a proposition.

On the other hand, the tenant may be the backward party in conservation work. If so, an impartial lease rider gives the landlord a handy device with which to encourage the renter to start a conservation program. Where the landlord is an absentee owner or has a local attorney or banker handling his farm, the tenant can make good use of the rider in persuading a hesitant landholder to do his part.

Since the lack of assurance of payment of unused value is oftentimes the thing which holds a tenant back, the rider deals only with those practices in which the tenant takes an aggressive part. It does not take care of soil-building practices which the landlord alone completes or pays for. It is generally understood that if the landlord completes a conservation practice such as liming or terracing, the tenant has no unused value coming.

It is well to recognize that these practices do not stand out alone by themselves. They must be considered with due regard to the whole set of relationships which exist between the owner and the tenant on a rented farm. Soil-building and soil-saving often come as a deal or trade between the tenant and the landlord. For instance, if the landlord will repair the chicken house or install a water system, then the tenant may agree to establish grassed waterways or contour a field.

NOTE.—The author is on the staff of the Iowa State College Agricultural Extension Service, Ames, Iowa.

Therefore, for the business purpose of figuring unused or unexacted value of limestone, it may be

(Showing Unused Value Due Tenant)

Soil Conservation Service employees, district soil commissioners, or county extension directors will help you estimate the probable costs of undertaking and completing the various practices on your farm. Either these estimates or the actual costs may be used to put a value on the tenant's contribution as the basis for payment to the tenant of the unused value due him.

With commercial fertilizer there is a great deal of difference, depending on what fertilizer is used

Lease year. March 1, 194_ to March 1, 194_	Description of Farm	Size of Farm	Acres.
Name of landlord	Section	Township	Range
Name of tenant			County
Type of lease (check one):	☐ Straight cash	☐ Livestock share	☐ Crop share cash
	☐ Other (specify) _____		
A. In consideration of the agreements herein contained the undersigned hereby engage that within the lease year above specified the conservation practices as set forth in schedule A below will be completed on the above described farm.			
B. It is agreed that the undersigned will share contributions and costs necessary to the completion of the soil improving and conserving practices in the percentages as set forth in section B below.			
C. It is agreed that the estimated value or cost of the tenant's contribution will be as listed in section C below.			
D. It is further agreed that in the event the tenant leaves the farm before fully realizing upon his investment of funds or labor contributed to the carrying on of the soil management practices, listed in section A below, he shall receive payment from the landlord for the unexhausted value in accordance with the schedule as set forth in section D below.			

[illegible]

Signed _____ Landlord
 _____ Tenant

and how heavily it is applied. It is well known that the value of commercial nitrogen largely disappears with one crop season's use, and, therefore, no residual value would be recognized from commercial nitrogen.

With superphosphate, potash, or mixed fertilizers containing mostly phosphorus and potassium, the rate of depreciation will depend a great deal on the amount of fertilizer applied and the crop on which it is used. Detailed recommendations for rate of depreciation under average conditions are given in the instructions attached to the lease rider.

In contouring an intertilled crop, since the tenant usually receives immediate compensation for increased crop yields and from saving of power, it is not customary to provide him with additional compensation for unused values for contouring. However, if Government payments are available for this practice, they naturally should go to the man who does the work.

Standard terraces may have an indefinite length of life. For purposes of setting unused value, it

is suggested that a 5-year depreciation period may be used with a flat 25-percent depreciation rate for each year.

It is customarily the responsibility of the tenant to supply normal maintenance for terraces once they are erected on the farm. If he fails to provide this maintenance, he should make a refund to the landlord for the cost of repairing the damage. In the case of a cloudburst, or similar uncontrollable damages, the landlord should share the expense of reestablishment and repair.

The construction of diversion terraces, dams, and reservoirs for livestock water should be handled the same as standard terraces. A 3-year depreciation schedule is suggested for grassed waterways. Where terracing, contouring, or strip cropping are followed, a major program for relocation across fences may be necessary. If the tenant makes a major labor contribution, it may be desirable to place a value on his labor invested and write it off at 20 percent a year over 5 years' time for this improvement.

EROSION STOPPED, PRODUCTION DOUBLED.—"The Soil Conservation Service came at an appropriate time for the land leveling that had to be done with the new irrigation system that was being developed," writes Roger Palmblade, Minden, Nebr., a cooperator in the Kearney County Soil Conservation District.

"The saving that has been made by the farmers in having the engineers . . . supervise the work of land leveling has run into thousand of dollars. The farmers are also given help in planning their irrigation units and crop rotation . . . thereby saving much labor and also water that was wasted.

"Terracing is a new idea to us and in just the short time that it has been done here we can see what we have been losing in topsoil for the past years. We were among the first farmers to install terraces in this community and we were more than pleased with its saving of soil and keeping the rains from washing down the hills. Last fall we had the heaviest rainfall on record for September and October and we really had a chance to see what moisture and soil-saving practices will do to rough land.

"We are being shown what controlled waterways and grass seeding can do to stop erosion. There are several farms in this area that have lost most of their topsoil but with terracing, contour farming, and grassed waterways their production has been doubled in many instances.

"There are dams being put in to control erosion, stop run-off water and supply drinking water for stock. We were surprised how much water we were losing until we saw what the dams were holding back. We are having a dam constructed this year for livestock water. We figure it will save use the price of a windmill, about \$300."

CORRECT TECHNIQUES OPEN NEW OPPORTUNITIES.—"I was one of the first cooperators with the Plum Beaver District and have found the mapping service and the complete farm plan, which is part of my agreement, one of the most important factors in helping establish and maintain a complete erosion control program," says Clarence Choat, St. Edward, Nebr.

"I have two drop-inlet soil-saving dams built in 1934 and 1935 which have completely controlled gullies that would otherwise be very serious by this time. One of these has a 30-inch square concrete tube which was larger than I thought necessary. Am glad now it was properly designed as it will be doing its job long after I am gone . . .

"Have several fields terraced at the present time and wouldn't part with a single one. I'm satisfied terrace system are properly laid out and constructed insofar as grade, size, and outlet protection, one of the most efficient practices available.

"Also, I think a bad terrace system is one of the worst things that can happen to a farm.

"We are in need of additional technicians in our district here and I know that is true in the district south of us also . . .

"Farmers at present are more able and more willing than ever before to go ahead and do something for their land and their future. They should have every opportunity to do it properly."

FARM VALUE TRIPLES IN FIVE YEARS.—"Five years ago, I purchased a farm in a badly run-down condition," says Bob W. Hall, Wynne, Ark.

"The farm consisted of about 50 percent pasture land, and the other 50 percent was level to gently rolling row-crop land.

"The five-year average for production of lint cotton at that time was 219 pounds per acre.

"I began soil conservation practices immediately and by strip cropping, terracing, building spillways, rotation of crops and using winter cover crops I have been able to increase the lint yield to 502 pounds per acre.

"The hill pasture land was brushed, fenced, and seeded in bermuda and lespedeza, which I estimate increased the price of the land per acre to three times the value for which it was purchased."

IRRIGATING for Profit



1



2



3



4



5

1. Plastic siphon tubes used effectively for furrow irrigation.

2. Good water application and cover crop on steep sloping land.

3. Intensive land use is joined with good water-control devices.

4. Good water control structures, skilfully operated, bring profits.

5. Underground pipe system on steep orchard land provides for effective water control.

By Frank Kimball

ALMOST ONE-HALF of all the irrigated lands in the United States are now in soil conservation districts, and the demands on the Soil Conservation Service for technical assistance in these areas are increasing daily. Farmers eagerly seek this assistance because it increases their profits.

The pay-off from the labors of irrigation farming depends largely on efficient control of water during its application to properly prepared crop lands, in accordance with the water needs of the crops. Farmers are coming to realize that the skill with which they operate their irrigation systems is one of the most important factors affecting crop yields.

The management of available water includes a field of operations which extends from the source of supply down to farm waste ditches and drainage outlets.

In order to maintain a stable agriculture in any section of the country, it is necessary that the best uses be made of soil and water resources, consistent with climatic conditions and other major considerations. Where irrigation farming is carried on, the agriculture practices are more or less intensified and require considerable skill and diligence. Operating costs usually run high and it is imperative that soil fertility be maintained and crop yields be kept high to assure profitable production. Livestock production and irrigation farming are inseparable operations in much of the West. In areas where irrigation must necessarily be practiced without benefit of livestock, costs go up and management problems become more difficult.

Labor and equipment shortage have served to focus more attention on problems of water management and farm management, resulting in considerable improvement in the operation of many individual farms. Usually these improvements are directly traceable to the adoption of conservation practices on irrigated lands, including more efficient use of water supplies, and the using of such lands according to their capabilities.

The most significant conclusion to be drawn from a study of accomplishments is that farmers who have applied conservation practices on irrigated lands have received increased profits for their efforts. For example, A. E. Watford, who received

some technical assistance through the Hagerman-Dexter Soil Conservation District, Roswell, N. Mex., has been able to increase his cotton yield 50 percent while cutting his irrigation costs in half. He has said that land leveling, relocation of irrigation ditches, and improved irrigation practices made this difference. "It was impossible for three men to irrigate my farm properly when I moved to this place 4 years ago," he recalls. "Last year I irrigated the place by myself."

Or consider the case of A. L. Roddick of the Mission Soledad Soil Conservation District in California. He leveled 155 acres of irrigated land in the late summer of 1944. Surveying, staking, and earth hand diagrams were furnished by Soil Conservation Service technicians assigned to work with the district. The earth moving was done by private contract, and involved 80,000 cubic yards of material. As a result, Roddick is now using 30 percent less water, and is saving 40 percent on irrigation labor. He is also getting increased crop yields due to better distribution of irrigation water. The land is used for sugar beets, carrots, spinach, tomatoes, and other field and truck crops.

Savings such as these, under intensive land use, clearly demonstrate the value of conservation work. At least it did for Roddick, for he has since leveled an additional 90 acres of irrigated land.

Most of the work which Soil Conservation Service technicians have dealt with in irrigated areas has been in connection with the improvement of physical works facilitating the use of irrigation water, and lands in need of conditioning for cultivation, improved irrigation, and farming practices. In the areas where sound conservation techniques have been established on the land and in water use, the trend of production costs is definitely downward, while the trend of crop yields is just as positively upward. The saving in labor alone on conservation-planned irrigated farms has usually offset a large part of initial costs of establishing the physical improvements. Additional profits are invited by the prevention of soil erosion and deterioration, and by the balancing of water supplies with desirable crop rotations.

In other words, in order to obtain satisfactory crop yields on irrigated farms it is necessary to adhere closely to the principles of good water use and good land use. Marked and continued deviations from either of these principles may not only cause drastic reductions in crop yields, but also permanent reductions in the productive capabilities

NOTE.—The author is head, irrigation section, engineering division, Soil Conservation Service, Washington, D. C.

ties of the land.

According to estimates made by the Soil Conservation Service, there are approximately 11,500,000 acres of irrigated lands in the United States on which one or more conservation measures should be applied, or for which irrigation systems should be repaired or improved. In order to get this conservation job done it will be necessary to make plans for improvements based upon detailed individual surveys, since general recommendations and standardized plans are not always applicable.

Irrigation lands range from native hay meadows to intensified truck farming, orchards, and specialty crops. It naturally follows that farm irrigation is influenced by a wide variety of factors. Some of the more important of these are climate, soils, water supply, condition of irrigation works, organizational problems, local irrigation practices, and markets.

The four main elements which Soil Conservation Service technicians have stressed in planning individual irrigated farms have been (a) land use, (b) land preparation, (c) water distribution systems, (d) water application. The engineering controls have been planned to facilitate proper land and water use.

Generally the irrigator is most concerned with the ability of his irrigation system to supply the needed amounts of water to his crops in the shortest lapse of time. The farm plan should include recommendations to enable him to achieve this objective, but at the same time it should assure uniform application of water to his crops without soil erosion or excessive use of water, and with a minimum amount of labor.

The first essential in irrigation is the adequacy of the water supply. Next in importance are the diversion, storage, or distribution systems which make it possible to get the water to the farm headgate. Generally, group associations, irrigation districts, or informal organizations are set up to operate and maintain these physical works. Repair and improvement jobs are often quite complex and require considerable engineering skill and ingenuity to prepare sound designs which are economically feasible.

Problems of inadequate water supplies, need for improvements in irrigation systems, exclusion of lands not suited for irrigation and poor land drainage are typical of those requiring group action.

While the interest in the solution of these group problems is continuing at a high level, the greatest number of requests for engineering investigations and surveys have been those connected with the preparation of individual farm conservation plans.

A plan of conservation operations, as prepared by Soil Conservation Service technicians, is based on surveys of physical conditions, farm history, and combined farmer and technical judgment, thereby eliminating a lot of guesswork and rule-of-thumb methods.

Technicians and farmers join in making trial irrigations to test out the systems that are planned. This method enables more accurate adjustment of the heads of water, lengths of runs or width of border strips, and adds to the knowledge of what are the most suitable irrigation conditions for each field.

Data as to the depth and profile characteristics of the soils in each field to be irrigated are necessary in order to estimate soil storage capacities and the rate of intake, or penetration of water into the principal rooting zones of the crops. Such information is best gained by actual irrigating experience, making frequent use of a shovel, auger, and moisture probe. It is also important to observe the amounts of water that can be turned into furrows, borders, etc., without causing erosion. Positive control over the amounts of water applied are usually obtained through the use of border gates, spiles, pipes, or other suitable devices for turning the water from head ditches into the fields.

Soil moisture is the most important single factor affecting crop yields on irrigated lands. From a practical point of view it is not advisable to wait until the available supply of moisture has been used up before applying the next irrigation because plant growth might be seriously retarded. Growing plants use water continuously, and the best crop yields are obtained when plant vigor and growth are uninterrupted.

In many areas water supplies are short in certain seasons. Here a workable balance must be maintained between water and crops. Crop rotations must be planned to conform to the availability of the water. The highest efficiencies from water applications will be had on soils where fertility has been maintained through crop rotations, manure, or commercial fertilizers as needed.

Water brings higher crop yields on a fertile soil than on one which is infertile.

Far too many farmers today are trying to irrigate irregular land surfaces. This practice just doesn't fit into plans for profitable farming operations. It takes more time and labor to get the job of irrigating done, and the crop yields and net profits are materially reduced, as compared with those from farms having fields properly leveled to facilitate uniform distribution of water. Irregular land surfaces produce irregular stands of crops, encourage excessive use of water, contribute to soil erosion, and aggravate drainage conditions.

Generally, the best farm irrigation systems and practices are found in areas where water supplies must be carefully managed to last throughout the season. When necessary, ditches are lined to prevent seepage losses, and structures in the ditches are constructed of permanent materials to facilitate control of erosion, and proper control and distribution of water supplies. Farmers in such areas also level and fertilize their lands, and con-

struct field distribution systems that enable them to obtain positive control over water applications.

In areas where water supplies are plentiful it is often difficult to interest farmers in adopting conservation measures in irrigating, until their pocketbooks begin to feel the effects of lowered income.

Another adverse condition is often found in areas where owners rent their lands to large-scale operators for production of truck crops. Here the irrigation systems and land preparation are usually of the highest types, but too often water applications are poorly made, soil-building crop rotations are not used, and attempts are made to maintain soil fertility solely through the use of commercial fertilizers. Lengths of runs are governed more by property lines than by soils and topographic boundaries, the interest of mass methods of planting, irrigating, cultivating, and harvesting. In spite of this type of management, crop yields are high and profits large—but conservation methods and practices would produce even greater profits.

FAITH—AND HARD WORK—BUILT THESE TERRACES

By Dale Jaedicke

"Quiero hacer terrazas dos pies de alto en mi terreno."

"I want to build terraces 2 feet high on my farm land," said 84-year-old Julian Montoya to the work unit conservationist of the Western Mora, N. Mex., Soil Conservation District. That was a few months ago, and now a large part of the terrace system has been built. However, many things happened in the meantime.

TO BEGIN WITH, the work unit conservationist was sure Señor Montoya would not be able to rent district equipment to build the terraces. Because of Señor Montoya's advanced age, together with the fact that he had no help on the farm, the work-unit conservationist was not too optimistic about getting the job done. District personnel discussed the matter and decided to try to sell Señor Montoya on strip crop-

ping as an alternate method of solving his erosion problem, though in this case strip cropping would not have been so good as terraces. This plan was tried, but to no avail, Señor Montoya wanted to build terraces. In the face of this determination a conservation plan was prepared which provided for terracing the land.

What district workers did not know at the time



It was this old plow, held together in spots with baling wire, that Señor Montoya used to build his terraces.

NOTE.—The author is district conservationist, Soil Conservation Service, Las Vegas, N. Mex.



Señor Montoya and Lawrence Redman, of the Soil Conservation Service, who helped plan the terraces.

but have since learned, was that Señor Montoya does not give up easily. Although 84 years of age, he is quite active and able to do a good day's work. Years ago Señor Montoya was in the sheep business. During a severe storm he lost nearly all of his 2,000 sheep. He started all over, only to suffer other losses—the loss of 622 lambs at one time. By that time he had had enough of the sheep business. He acquired a small sawmill, but when he got ready to undertake his first large operation he came home one day to find his mill destroyed by fire. Discouraged, but not to the point of quitting, Señor Montoya started farming. His farm, 437 acres of pasture and 47 acres of cultivated land, is located on the Coyote River about 10

miles northeast of the town of Mora, N. Mex. Through the years he noticed he was losing his soil and finally decided to do something about it—build terraces 2 feet high. It was then that he asked the Western Mora Soil Conservation District for help.

Part of the terrace system was laid out and Señor Montoya started to build terraces—2 feet high, using an old disk plow pulled by horses that were not too husky. The plow had a broken wheel and had been mended in many spots with baling wire. The actual mechanics of building terraces with this equipment were not too clear to Señor Montoya, but the district engineering aide helped him get started. Day after day he plowed, always moving the dirt toward the center of the terrace. At that time of the year the days were short and the early mornings quite cool, so that the actual working day wasn't too long, but he worked some almost every day. After plowing about 40 rounds, Señor Montoya decided he had moved all the dirt he could with the disk plow, but still his terraces were not quite 2 feet high. He hitched his team to a fresno and started moving dirt with it. There wasn't much to do—one pass with the fresno—and the terrace was completed. He went from that terrace to the next and then the next. Planting time approached, so he suspended the work until after harvest, when he intends to finish the job.

"I may not live to see all the benefits," he says, "but it should show others nearby what can be done without a lot of expense and special equipment."

Terracing isn't the only conservation practice undertaken by Señor Montoya. His pasture was unfenced, and, as a result, outsiders were overgrazing his land with sheep. To build a fence around the pasture required a lot of work, as it was rough, mountainous country, but the aged farmer built the fence all by himself. It took quite a while to cut posts and to carry them to the fence line, and to carry the spools of wire to the line. But he kept after it, day after day, until the job was completed.

Recently he asked the work unit conservationist if he could get some help in establishing a windbreak to protect his homestead and small orchard. The district provided the planting stock, and Señor Montoya planted it. He doesn't think that he will live to see the benefits—but, as active as he is now, there are some who think he will.



Chief Long John Jasper Whitebird (Hugh Bennett) in full regalia.

Crow Tribe extends Heap Big Welcome to *Chief Long John Jasper Whitebird*

NOT IN MANY MOONS had the Crow Country, on the Little Bighorn out Montana way, seen such big doings as those which marked Soil Conservation Day, July 22, in Hardin. Famed lovers of the land, the Crow Tribe made mighty plans, far in advance, to provide a fitting welcome for their white brother, Hugh Hammond Bennett, valiant warrior against the forces which would despoil the wood, the valley, and the stream.

The Crows sent out their best hunters to find and kill five well-meated buffalo. Barbecueing pits were prepared. An invitation went forth to friends of the soil for miles around to come—with lusty appetites for great feasting and speech-making, big music and ceremony. Crows, people from soil conservation districts, State officials, educators, businessmen, civic leaders, and others, to the number of 5,000, came to pay tribute to soil conservation and to Dr. Bennett, its distinguished advocate. First on the agenda was an inspection tour, by automobile, of soil conservation achievements in nearby areas under the aegis of the Big Horn Soil Conservation District.

The Crow Tribe, in traditional ceremonial dress, took Hugh Bennett to themselves, as the adopted son of Sidney Blackhair. In an impressive induction ceremony, the tribesmen made Bennett a member of their Grass Dance Society—a full fledged Crow, giving him the name and title, Chief Long John Jasper Whitebird.

Gen. Tom Campbell, reputed to be the largest wheat farmer in the world, in presenting the Chief of the Soil Conservative Service to the audience, told of his findings on a recent trip around the world: "In Australia I found a better knowledge of our guest's work than many of us have at home. In China, Generalissimo Chiang Kai-Shek said that he hoped some time to have this man directing their soil conservation program. Officials in Egypt were just as enthusiastic and when I was in South Africa Field Marshall Smuts told me how happy he was to have our guest with him. Later, French Government officials expressed a hope to have this man inspect the great area in North Africa between Casablanca and Tunis, which is semiarid. Very few men have such universal recognition.

"It is not strange that we are all very proud to have a man of such rare accomplishments with us today * * * the world's first authority on moisture conservation and erosion control."

In the feature address Hugh Bennett recalled that Theodore Roosevelt learned about the land at first hand up here in the Dakotas and Montana in the '80's and was one of the all too few early crusaders for conservation of the Nation's forest, soil, and other natural resources.

Bennett also recalled the cooperation of the Soil Conservation Service and the Bureau of Indian Affairs in connection with a reconnaissance survey made by the Service on the Crow Indian Reservation in 1939—a survey on which were based recommendations for conservation measures to safeguard the Crow country and make it more permanently productive.

“Of all the matters of urgency which face the Nation today,” he said, “none is of greater importance to the people of the Big Horn Valley—and the rest of the country, for that matter—than the conservation of our limited remaining areas of productive land. You here in Big Horn and Yellowstone Counties have demonstrated your own conviction of this fact, first by voting to organize the Big Horn Soil Conservation District, which is our host today at this inspiring Conservation Field Day, and afterward by voting to extend the district to additional lands in this important Montana agricultural area. And I understand that a third extension of your district is to block out the whole of Big Horn County.”—WELLINGTON BRINK.

Remarks by Joe Medicine Crow, Member Crow Tribe

Soil Conservation Day, Hardin, Mont.



Left to right: George Brown, Harry Don't Mix, Johnny Hold-the-Enemy, Hugh Bennett, Sidney Blackhair, Chester Medicine Crow, Art Bravel, and Thomas Yellowtail.

THIS IS INDEED an auspicious day to all the people of Big Horn County and of the Crow Reservation, one, I am sure which will stand as a highlight in the annals of this part of the State. In behalf of the Crow people, Dr. Bennett, I wish to extend a heap big welcome to you and may your visit with us today be a happy one and long remain in your heart.

At this time comes a solemn moment in our program, the enactment of the Crow induction ceremony, a traditional rite used to induct new members into the Grass Dance Society, a society for men of rank, honor, and achievement. The members of the society, headed by Sidney Blackhair, and the members of the tribe as a whole, deem

it a special honor to induct Dr. Bennett into the Crow Tribe because he is regarded as a man whose knowledge and skill have been dedicated to a noble cause—that of conserving the health, the beauty, and the good in the soil, which is consistent with the Indian's philosophy of this natural environ, namely, the land itself which he affectionately calls his Mother Earth.

From time immemorial the Indian has been a conservationist. He never purposely exploited the animals of the forests and plains, nor the birds of the air, nor the things that grow upon the land. He considered all creatures and plants as his inherent blessings from the Great Spirit, and, therefore, used them reverently and wisely.

So it is with this traditional concept in our hearts, Dr. Bennett, that we are happy and honored to accept you as a brother. We know your heart is good and your work is noble. You have come to the heart of the Crow Country, once a great natural empire. It is a good country. When a fur company expedition approached the Crow Country, Chief Arapoosh met them upon a high mountain top and spoke to them thus:

“You see before you my country, the Crow Country. It is a good country! Why? Because the Great Spirit has put it in exactly the right place. To the north it is too cold; to the south, it is too hot; to the west the land is rocky and rough and our brethren there must eat only fish; and to the east the land is flat and barren and the water

dirty. Yes, the Crow Country is a good country. In it are many animals that provide for my food and shelter; in it grow many berries and plants that are good to eat. Treat my country well and it will treat you well in return; despoil it and it will despoil you in the end."

Dr. Bennett, the wild animals have retreated into the fastness of those yonder mountains, but in their stead now graze fine herds of cattle and sheep; the wild berries have receded into the waste of the wilds, but in their stead have come into existence rich fields of grain, hay, and beets.

It is our hope that with men such as you to guide us that we will be able to follow the words of Chief Arapoosh when he said, "Treat my country well and it will treat you well in return."

SAVE SOIL AND SAVE ALL

(Continued from page 84)

With the profits from my enterprises, I have bought a tractor; this will help me increase my farming operations so I can help with the feeding of the starving people of the world.

I can truthfully say that agriculture has been my past, agriculture and F. F. A. my present, and agriculture and vocational agriculture teaching, along with soil conservation, I hope will be my future.

Then, if this job of conserving our few inches of topsoil is carried out, the time will come again when we can say that the Roanoke River is a crystal-clear stream, full of trout and other fish, and not a muddy river of mud cats.

Now if I may, I shall use the words of Thomas Jefferson. While in Paris, Thomas Jefferson wrote John Adams, saying, "The cultivators of the earth are the most valued citizens, most independent, most virtuous, and are tied to their country and webbed to its liberty with the most everlasting bonds."

CONSERVATION MAJOR FACTOR.—"You wouldn't know it was the same farm," writes Carl Smith, Chatsworth, Ga., a cooperator in the Limestone Valley Soil Conservation District.

"My yields per acre in 1946 were a bale of cotton per acre, 40 to 50 bushels of corn per acre, and I have changed my type of farming from row crops over to close-growing crops, such as annual lespedeza, lespedeza sericea, and have enlarged my acreage of permanent pasture, on which I am growing white Dutch clover, Dallis grass, Kentucky bluegrass and annual lespedeza, and in the place of de-

pending on one crop for my income, I have several crops today that furnish income. For example, I have a herd of Hereford beef cattle which consumes the lespedeza hay and pasture grasses that I produce on my farm, which in turn gives me a nice revenue. And since my hay crop was very good in 1946, I am selling several tons of annual lespedeza hay this spring.

"I have been able to operate this farm and, with my expenses, I save some money, although I realize that the increase in prices of farm products have played a great part in my increased income. I sincerely believe the soil conservation program that I have established on my farm has been the major factor in my increased income. I have been able to save some money, and, at the same time, build a house and barn on my farm . . . I was forced to construct a barn to take care of my cattle and increased production of hay. I also found that kudzu was an excellent crop for hogs."



BETTER FARM FOR SON.—"One reason I am grateful for the help and guidance I have been given by the Soil Conservation Service is that my boy, who has been overseas in the army, is willing to stay with me now since he returned," writes J. C. Gunter, who operates a 240-acre farm near Austin, Ark.

"In June 1939 the Soil Conservation men came at my request to help me plan my farm. We went over every field and decided on what needed to be done. At that time I was depending on cotton for my cash crop and the average was about one-half bale per acre. Corn produced about 20 bushels per acre. I was just barely making enough money to get by and had been increasing my acreage of cotton as my yield went down so that I could pay for my land and live.

"In 1940 I started cultivating on the contour and planting cover crops. In 1941 I terraced about 11 acres of rolling land. I rotate my crops and have continued improving my soil until now I can produce a bale per acre. In fact, in 1945 I produced 11 bales of cotton on a little less than 10 acres. On July 5, 1945 I planted 5 acres of corn following a crop of vetch and produced an average of 30 bushels per acre. Fall oats produced 44 bushels per acre and the lespedeza I planted on the oats in the spring made more than two tons of hay per acre. This same oats and lespedeza furnished grazing for 45 head of beef cattle for two months.

"In 1946 I produced 13½ bales of cotton on 11 acres. Six acres of corn produced 240 bushels, which was the best corn I ever produced on this farm. My oats made 40 bushels per acre.

"In addition to improving my crop land, me and my tenant started improving my pasture soon after the place was planned.

"Since I have been farming the conservation way, my yield and income have more than doubled. If I had to go back to the old system I would quit farming. In addition to having several cash crops I sold 11 yearling calves in 1945 for \$1107. This year I sold 26 head for \$2785.

"Since I started on this system of farming I have built a large barn and have added electricity and modern conveniences to the home."

WHAT'S HAPPENING OUT ON DISTRICT FARMS

HOLDING THE LINE ON LIVING STANDARDS.—

"When the Missouri Assembly passed the Missouri Soils District measure in 1943 and Harrison Company formed the first soil district in the State, with a group of 14 other farmers in my community I signed a balanced farm plan covering 685 acres of my land," writes Fred G. Powell, Eagleville, Mo.

"The remaining 200 acres being in a different community, will be signed up with a different group which has its application before the county board of supervisors for approval at the present time.

"With the help of the Soil Conservation Service there has been already constructed 55,000 feet of standard terraces, 3750 feet of terrace outlets, 8 farm ponds piped and fenced. The farm plans on the land call for additional construction of all these types each year until the farm plan has been completed.

"In addition to work completed on my own land there have been 17,200 feet of terraces and 1200 feet of waterways built on 200 acres of land, of which I am trustee, which is left in trust to two local churches. There has been 3,000 tons of agricultural limestone applied on my land, and an average of 4 tons of commercial fertilizer is applied each year.

"The average production of these acres has been increased at least 60 percent, much of the thinner land and the land having greater slope has more than doubled in production. This increase in production and controlled soil erosion is the direct result of educational and demonstration projects carried on by the Soil Conservation Service in this area in co-operation with local farmers.

"While this letter concerns only land in which I am personally interested, the same thing is happening on a great many northwest Missouri farms, a section of the country where the intense grain farming that was necessary during the first world war removed a large part of the good top soil and left the entire area in a condition where the productivity of the land must be restored or the farm standard of living lowered.

"This same thing has happened in a lesser degree during the last war making it necessary to again step up our soil conservation measures to hold the line on farm living standards when farm prices again drop to their natural level."

DAIRY PRODUCTION UP.—"I have recently compiled some figures from the records of the Tillamook County Creamery Association for the annual report of the South Tillamook Soil Conservation District, showing the increase in production in the district as compared to production in the county outside the district," writes E. E. Allen, Jr., Sand Lake, Ore., chairman of the Board of Supervisors.

"Tillamook County Creamery Association is a cooperative organization of 17 cheese factories which handles all the milk produced in the county. Dairying is the only agricultural activity in the county.

"As you know, the Soil Conservation Service has been cooperating with the district since its organization in 1941, and the assistance it has given us both in equipment and technical service, is in a very great measure responsible for the success we are enjoying.

"Following are comparative figures on production :

	1941 pounds of milk	1945 pounds of milk	Percent Gain or Loss
Factories within the district.....	30,020,656	34,202,813	+13.9
Factories outside the district.....	64,639,320	52,826,684	-18.2

WHOLE FARM WORKING.—"At present I haven't got a single idle spot on my farm," writes S. B. Huff, of the Greenville County Soil Conservation District, Piedmont, S. C.

"Meadow strips were put in proper places, land too rough for cultivation was put in sericea and kudzu, border strips established and woodland improvement started.

"I have reduced my cotton acreage to one-half and still make just about as many bales as I use to under the old method. I am gradually reducing the amount of fertilizer used.

"I have reduced acreage planted to corn, and seed a large acreage of small grain with greatly increased yields.

"Under the old system it was a difficult job to have enough food for livestock but now the problem is somewhere to put the feed crops harvested.

"I follow strip cropping throughout my farm and I will say that any farmer that does not follow this system in the Piedmont section is working squarely against himself.

"I follow all grain with lespedeza and do not cut much for hay but more for seed."

AFTERTHOUGHT.—After the article by M. J. Keesee, Mississippi Rolls Out a Green Carpet, went to press for October publication, it occurred to the editor that many readers undoubtedly would be interested in a more detailed description of the land blocks outlined on the land use map of the R. A. Coley farm. From Service technicians in Mississippi, therefore, we have obtained the following supplementary information as to this particular farm:

CLASS II-A—Good land that can safely be cultivated with good management practices if drained; fairly deep, moderately permeable flat bottom land soils.

CLASS III—Moderately good land that can safely be cultivated with intensive conservation practices; fairly deep, slowly permeable, moderately eroded upland and terrace soils mostly on gentle slopes.

CLASS IV-A—Fairly good land that is best suited for pasture, hay, or woodland, but can be cultivated occasionally; shallow, slowly permeable, slightly eroded flat terrace soils.

CLASS VI—Fairly good land that is best suited to pasture with good management and may be used for woodland; fairly deep, slowly permeable, moderately to severely eroded upland soils on steep slopes.

FILM AVAILABLE.—Wherever Raindrops and Soil Erosion has been shown, it has met an enthusiastic response. This film is now available in revised form. The main body is unchanged but there are new opening and closing sequences which relate the picture to the whole soil-conservation program. A brief explanation of soil detachability and soil transportability has been added.

An interesting and dramatic feature of the new version is an extreme close-up of several drops of rain striking wet soil surface. This is shown in color by use of special camera equipment obtained from the Navy Department, equipment which photographed at 3,000 frames of film per second. When this film is projected at 24 frames per second, the action is slowed down to where the scene might almost be mistaken for an atomic bomb explosion.

Early reports from Maryland showings indicate that Raindrops and Soil Erosion will be very useful. Prints will be obtained on loan from regional film libraries, Soil Conservation Service, at Upper Darby, Pa.; Spartanburg, S. C.; Milwaukee, Wis.; Fort Worth, Tex.; Lincoln, Nebr.; Albuquerque, N. Mex., and Portland, Oreg.



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*December
1947*

SOIL CONSERVATION

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

SOIL CONSERVATION•

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SECRETARY OF AGRICULTURE

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CHIEF, SOIL CONSERVATION SERVICE

ISSUED BY SOIL CONSERVATION SERVICE, U. S. DEPARTMENT OF AGRICULTURE
WASHINGTON, D. C.

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WELLINGTON BRINK

Editor

Art Work by

W. HOWARD MARTIN

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PASTURES PUSH PRODUCTION.—"For many years we have been hearing about pasture improvement," writes Howard R. Kellie, of the How-Ann Dairy, Orlando, Fla. "I don't know why we haven't gone ahead with it. I guess we thought we were too busy. Last spring we decided to do some of it.

"With the advice of Mr. W. B. Hutcheson and Mr. G. F. Keen (Soil Conservation Service technicians) we had 35 acres cleared with a bulldozer. We left a few clumps of trees for shade. We cut it with a heavy disc. We had it cut twice with a light grove disc to level it up. Just before seeding it we put on a ton of lime per acre. We sowed it to Alyce clover and Bahia grass, about 12 pounds per acre. After it came up we put on 800 pounds superphosphate per acre. The clover came up nice and made us a nice pasture.

"When it was up about a foot high we turned the cows in. Our production started to increase and our feed bills go down.

"We are milking 60 cows. Our production went up about 10 gallons a day during the severe hot weather. Our saving on feed was around \$150 a week.

"The total cost of the pasture improvement was about \$2,000. I know we will save more than that this year. Then we have a nice stand of Bahia."

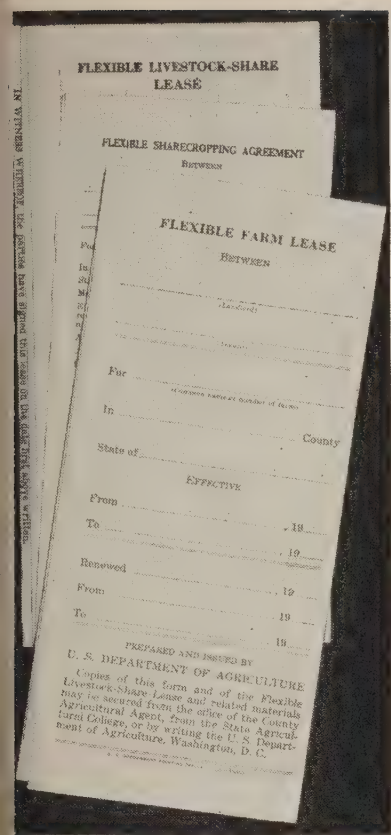


THE COVER.—The soil conservation districts facilitate big-scale drainage projects. This dragline is busy cleaning out an old main ditch near Grifton, N. C. It runs 5 miles, drains 28,034 acres, serves 13 farm units. The

photo is by Hermann Postlethwaite.

LAND TENURE FOR SOIL CONSERVATION

By E. C. WEITZELL and M. M. THARP



Standard leasing forms of the Department of Agriculture.

LAND TENURE is the right to control and use land. This right may be very limited as in the case of a sharecropper; or it may be more nearly complete and unlimited as provided by a fee simple title under our system of private property. This range of legal rights to the control and use of land involves two major factors which are important aspects of the problem of soil and water conservation. *First*, land owners are free to destroy or conserve their land, as they see fit, except to the extent that they may be compelled to abstain from waste and other damages in the interest of public welfare. *Second*, various tenure conditions and arrangements may give rise to temporary economic advantages that can be realized through exploitative farm practices. These basic characteristics seem to provoke most of the tenure problems of conservation. Short time exploitative interests and careless land management have been permitted under the existing concepts of private property. Uneconomically small units, excessive debt obligations and faulty leasing arrangements permit and often compel farmers to exploit their resources, particularly during periods of economic depression when they must meet heavy fixed costs.

Solutions to the problems of soil conservation associated with land owner operation are not always simple. In the early days of cheap land, exploitation may have appeared to be a plausible alternative for ambitious farmers. Those days are past, but even now, farmers may not feel responsible for the welfare of future generations. Too often, the objective of both land owners and tenants has been to gain a maximum income during each individual year, without giving enough attention to the fact that future incomes will be dependent upon the productive capacity that has been built up and maintained during preceding years. Of course, the lack of general knowledge concerning methods and techniques for achieving soil and water conservation has only recently been supplanted by experimental work, demonstrations, and the teaching of improved land management; so both owners and tenants have been subjected to the damaging effects of erosion and depletion.

It cannot be said validly that any particular form of land tenure has been generally responsible for the existing condition of our land resources. Past forms of tenancy and leasing have not been conducive to conservation but many of the eroded and depleted farms now operated by tenants may have been reduced to this condition under exploitative owner-operation, and erosion damages are not limited to tenant-operated farms today. So it is apparent that more fundamental factors contribute to the problem.

In addition to their possible lack of knowledge, or carelessness, mismanagement or short-term exploitative interests, many owner-operators are faced with some important tenure problems. The most common is the question of farm units of inadequate size and productivity. Many farmers in the eastern part of the United States have access to so little land that they are forced to exploitative practices in order to gain a living. Land that is unsuited to crops is used and subjected to accelerated erosion, be-

NOTE.—The authors are agricultural economists, Bureau of Agricultural Economics, Washington, D. C.

cause they can't get more suitable land. This pressure for subsistence is particularly strong during depressions, when supplemental nonfarm income from other work is not to be had. Of course, if small, low-quality farms are operated by tenants the pressure for current income is intensified by the demands of two interests instead of one; actually total income may represent an inadequate return to the tenants' labor alone.

Excessive debt is another problem that has plagued owner-farmers. During periods of prosperity some farmers are prone to mortgage their holdings to the extent that they have difficulty in meeting their financial obligations when their income drops. They are forced to follow a "take off—put nothing back" production policy in order to retain their homes and the elements of a livelihood. It is to be hoped that this situation, which bankrupted so many farmers during the 1930's, can be avoided in the years to come.

Otherwise the theory that farm owner-operation is conducive to good land husbandry has substantial validity in actual practice. Its validity rests on three precepts: (1) that permanent interest in a particular piece of land is conducive to the maintenance of productivity and conservation; (2) that people instinctively give greater attention and care to property they own; and (3) that the security of ownership assures farmers the right to returns that may come from any improvements they make. Just as these are the good points of owner-operation, so the lack of long-time interests, security, and care has been the major fault of tenancy.

One solution is to assist tenants to become owners, but this procedure has severe limitations. For various reasons it is probable that nearly one-third of our farmers will continue to be tenants. The 1943 Agricultural Census found that 31.7 percent of all farms were operated by tenants (including croppers), and that 37.8 percent of all the farm land was operated by tenants or part-owners under some form of leasing arrangement. Although the percentage of tenancy was shown by the 1945 census to be lower than at any time since 1900, it is probable that a substantial amount of farm land will continue to be operated under various types of leasing arrangements. Thus, to the extent that farm land tenure may influence the realization of soil and water conservation it is important that tenants and landlords, as well as owner-operators, be encouraged to husband the soil in a way that will maintain the basic elements of productivity.

Tenancy is not necessarily an undesirable form of land tenure. In fact, tenancy seems to play an important role in a healthy democratic agricultural economy. There are several reasons why this is true. Some of them follow: (1) Land and agriculture is one of the main fields of investment for both farm and nonfarm capital. Consequently, many investors will continue to require tenants to operate farm business enterprises, just as stockholders require management and labor to operate industrial firms. (2) Tenancy provides the means for young farmers to learn farming and to accumulate capital with which to buy equities in their own land. (3) Agriculture may be the best available employment for many people who lack the training and ability and knowledge to carry the full responsibilities of owner-operation; but who may be able to farm as successful tenants, with their landlords providing financial and general managerial assistance. (4) Some farmers prefer to invest their capital in machinery and livestock rather than land and so be in a position to operate a larger business unit than would otherwise be possible. A substantial amount of the part-owner leasing may be the result of this preference. (5) Tenancy is a method by which the financial risks of farming may be shared between the farm operator and the land owner. To the extent that farm tenancy remains as a segment of the institutional relationships between land and man, it obviously will be desirable to improve this relationship in behalf of conserving irreplaceable soil and water resources.

Improvements in land tenure relationships are paramount, in addition to the continuing need for education and technical assistance with regard to the character and application of conservation. The solution to this problem seems to consist of the following possibilities: (1) prevent and eliminate the more severe economic pressures that cause owners and tenants to exploit land resources and (2) improve the contractual relationships between land owners and tenants so that both parties will be encouraged to bear an equitable share of the costs of conservation and receive a corresponding share of the benefits.

In behalf of eliminating the economic pressures that result in exploitative land use, there are sharp limitations. Except to the extent that certain controls on loan credit can be enforced, each farmer must personally refrain from contracting excessive debt. In appraising the amount of mortgage

debt that can be safely carried, greater attention should be given to long-time or normal earning capacities. Some progress has been made in providing mortgage contracts with variable repayment plans in order to relieve the pressure of financial obligations during periods of low income. Of course, it is possible that the failure to recognize the dangers of inflated mortgage debt may again require debt adjustments and debt moratoria similar to the action taken less than fifteen years ago.

The achievement of farm units of a size that will provide adequate support to both owners and tenants involves even greater obstacles. The basic pattern of land tenure and the associated human relationships to land are difficult to change after they become established. The average size of all farms in the Nation has been increased slightly during the past decade, but the increase came usually through additions to the larger farm units. Little or no progress has been made toward increasing the size of small "problem" farms. The problem of inadequately small farms is so complex that advance toward a satisfactory solution is likely to be slow. The only reasonable procedure seems to be to provide any capable farmers who are trying to farm inadequately small units with the facilities to acquire more land as it becomes available, or to intensify the use of available acreages and thus increase the size of their business.

Possibilities of improving the contractual relationships between tenants and landowners, in favor of provisions for soil and water conservation, are more promising. The usual criticism of tenancy is that short-term leases do not give the tenant enough interest in land resources to encourage investments in conservation. Any farming plan that requires the tenant to invest in soil-conservation practices may necessitate a relatively long lease unless some other contractual method is used that will permit the tenant to realize a full return on his investment. However, there are certain problems connected with long-term leases that make some landowners and tenants unwilling to adopt agreements of long duration. Difficulties and dissatisfactions may arise (1) from provisions for a fixed cash or share rent, (2) from the fact that landlord and tenant may know very little about each other and so not wish to be tied down with agreements of long duration, and (3) from

the lack of an agreement to continue the lease for a succeeding term. Of course, special provisions can be included in the lease to overcome these shortcomings, but because only about one in five leases are written, other means for assuring soil and water conservation are needed. This has led to the conclusion that the usual rental agreements, whether written or oral, should be supplemented by a written provision for conservation that would interest both the landowner and his tenant, regardless of the duration of the contract.

A tenant who has no assurance that he can stay on any particular farm for more than a year or two is likely to plan his farming in a way that will bring the largest possible cash return during each immediate crop year. This means a tendency to use exploitative soil management practices. An agreement between landlord and tenant providing *compensation for unexhausted improvements* seems to be the most reasonable solution; along with leasing provisions that define the duties of both owners and tenants with respect to conservation. The freedom of an exploitative economy has ignored the need for provisions of this type but as owners realize what is happening to their resources they begin to seek new leasing provisions that specifically provide for conservation and generally improved cultural practices.

Mutuality is the basic principle underlying the philosophy of compensation for unexhausted improvements. Advantages should accrue to both land owner and tenant, and mutual responsibility is necessary for success. The principal aim of a compensation agreement is to put the tenant farmer in a position as nearly like that of an owner-operator as is reasonably possible with respect to the improvement and conservation of farm lands. If he has assurance that he can get back a fair amount of what he has spent on soil conservation and other improvements, if the lease ends before their productive value is exhausted, a tenant is in a position to do a better job of farming. He can take care of the farm as if it were his own—and perhaps that is the best assurance an owner can have that his farm will be improved and conserved.

Although the *Flexible Farm Lease* developed by the U. S. Department of Agriculture, and many of the leases developed by the State agricultural experiment stations provide that the tenant will be compensated by the owner for soil-conservation improvements made at the tenant's own expense, a

supplemental agreement is usually necessary to cover details. It should be simple, and concise, in enumerating the conservation measures to be applied and the division of expense (including the tenant's labor) to be borne by land owner and tenant. Another important and necessary item is a depreciation schedule for the measures and improvements agreed upon. This schedule should list the value of the tenant's contribution remaining at the end of each year, for a given period. The period of depreciation probably should vary, depending on the "life" of the improvement. Fertility practices might be grouped under a 5-year depreciation schedule but if improvements such as terraces, fencing, and gully control are installed jointly by the tenant and the owner the depreciation period probably should be 10 years or longer.

Agreements providing for joint application of soil conservation practices and measures should include a statement indicating the way the tenant will be paid for the unexhausted improvements when his lease expires. One way is to credit the tenant for the remaining value on any cash rent due the owner when the lease terminates. Another is for the owner to make a cash payment to the tenant for the remaining value of the conserva-

tion practice. Both the method of settlement and the exact method for calculating the compensation due should be clearly stated in the agreement.

A usable form (USDA Form Agri-6) for providing compensation for unexhausted improvements was developed by the Department of Agriculture during the war. This form applied only to soil-conservation practices and improvements made by the tenant with labor furnished by him. As conservation practices made entirely by the owner give some benefit to the tenant through increased productivity, they are assumed to be equalized by agreement on rental rates and are not covered in the conservation supplement.

The USDA form was designed for use as a supplement to an existing lease, or it could be used as a memorandum of understanding concerning conservation practices and other items if there were no lease. Section 3 of this form (reproduced below) covering improvements is pertinent to this discussion. This section consists of a simple table for listing soil conservation practices and improvements to be made by the tenant. Space provides for listing the cost or value of materials furnished by the tenant and owner and the value of the tenant's labor used in making the specified

3. The tenant may, with labor furnished by him, place the following improvements on the farm:

IMPROVEMENTS AGREED TO BE MADE BY TENANT	COST OR VALUE OF MATERIALS TO BE FURNISHED BY—		VALUE OF LABOR TO BE CONTRIBUTED BY TENANT	REMAINING VALUE OF TENANT'S CONTRIBUTION IF LEASE SHOULD BE TERMINATED AT END OF—				
	Landlord	Tenant		1 year	2 years	3 years	4 years	5 years
	\$-----	\$-----	\$-----	\$-----	\$-----	\$-----	\$-----	\$-----

If the lease should be terminated or expire before the end of 5 years after the making of any such improvements by the tenant, I agree:

- (a) To compensate him for the remaining value of his contribution as shown in the table above,
or
- (b) To permit him to remove such improvements, or
- (c) To lease the farm on terms that will require the incoming tenant to pay the present tenant the remaining value of the tenant's contribution.

If the tenant is to be compensated as provided in (a) or (c) above, compensation will be paid as follows:

improvements. A third part of the table provides space for listing the remaining value of the tenant's contribution at the end of 1, 2, 3, 4, and 5 years for which the owner agrees to compensate the tenant when the lease expires, or is terminated.

This form is no longer in use but the section providing for compensation might be the basis of a conservation supplement to the *Flexible Farm Lease* which is currently recommended by the Department of Agriculture; or it might be used as the essential part of a supplemental conservation agreement between a land owner and tenant regardless of the type of lease used. If only an oral agreement is made the proposed supplement could set forth specific conservation practices to be used, along with the allocation of both the estimated costs and the expected benefits, between the owner and the tenant. A positive agreement in this respect is highly desirable, as a tenure policy. Soil conservation on leased farms will be a reality only to the extent that owners and tenants agree to make it so.

Notable progress in the use of supplemental agreements for compensation in Iowa was reported in the February 1947 issue of *Country Gentleman*, under the title of "Conservation by Agreement," and also in *SOIL CONSERVATION Magazine* in November 1947. These articles report the use of a "conservation rider" as a supplement to existing farm leases that was introduced by Professor I. W. Arthur of Iowa State College. This rider, an extension of the customary cash or share lease, sets forth the contributions that both the landlord and the tenant agree to make to soil conservation practices, and provides for the proportionate sharing of the benefits, according to the contributions made. As a solution to the problem of short-time tenant interests in any particular farm, the tenant is assured of just compensation for all unexhausted conservation improvements he has made, if he does not remain on the farm until their value has been used up.

Establishing the residual value of the several types of improvements at the expiration of each year following application or installation of the improvement is the most important aspect of the "compensation for unexhausted improvements" idea. Residual values after one or more crop seasons, will vary, of course, under different circumstances. The value of lime, terraces, diversion ditches, and numerous other measures and

practices that remains after any particular period of use must be determined as a basis for settlements regarding unexhausted improvements. This kind of information is fragmentary at best. As a basis for land tenure agreements relative to the application of soil and water conservation and settlements for unexhausted improvements, there is a general need for the accumulation of all pertinent data that can be found. Residual values of various measures and practices must be developed for the major resource areas. These values must be supported by adequate research and experience so they will be acceptable to all parties concerned.

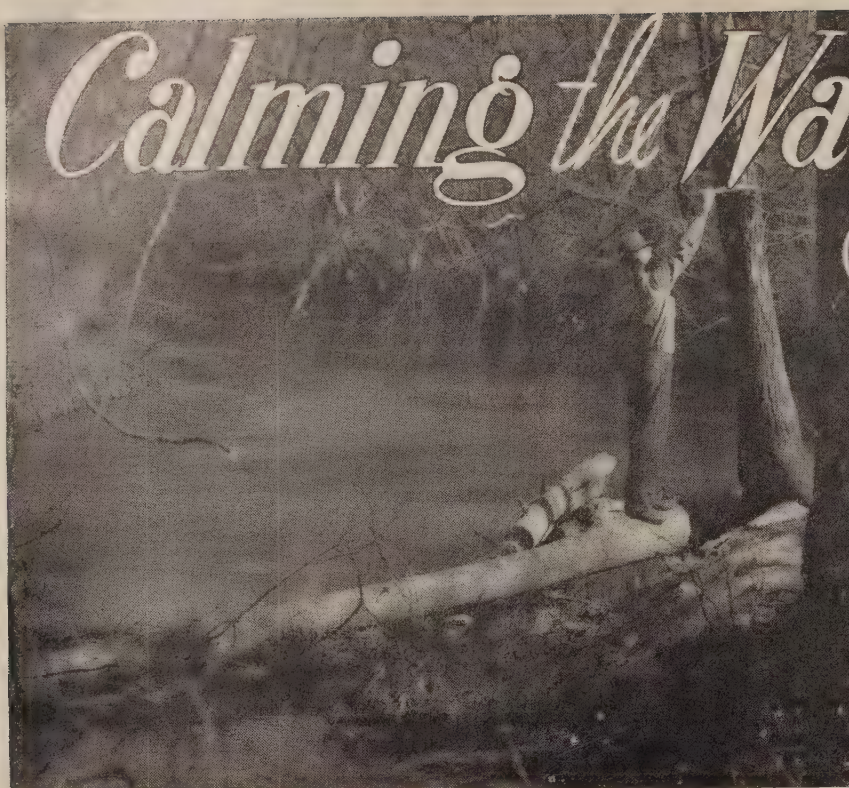
The Illinois and Iowa Agricultural Experiment Stations, for example, have made considerable progress in this direction. As a part of the "conservation rider" to existing farm leases the Iowa Agricultural Experiment Station suggests depreciation schedules for terraces, applications of lime and phosphate, drainage, and other farm improvements. Illinois makes similar recommendations for lime and various types of fertilizers. Other state and federal agencies may have considerable data that could be adapted for this use. And if tenure agreements involving the joint responsibility of owners and tenants for the application and maintenance of conservation practices are to be a reality, generally, it probably will be necessary to establish research projects to obtain the essential information for many areas.

It may be desirable to make provisions for conservation an integral part of the farm lease. Conservation must be a part of the crop and livestock program if it is to be enthusiastically supported by both land owners and tenants. It usually is a basic part of the land-use program, and certainly crop and livestock enterprises should be built around the conservation program. Changes in land use, growing additional forage, growing less row crops and having more pasture, are all possible aspects of soil and water conservation. It is evident that these are essential elements in the entire farm organization and management program. Likewise, they are essential factors in the costs and returns picture, which land owners and tenants should jointly share.

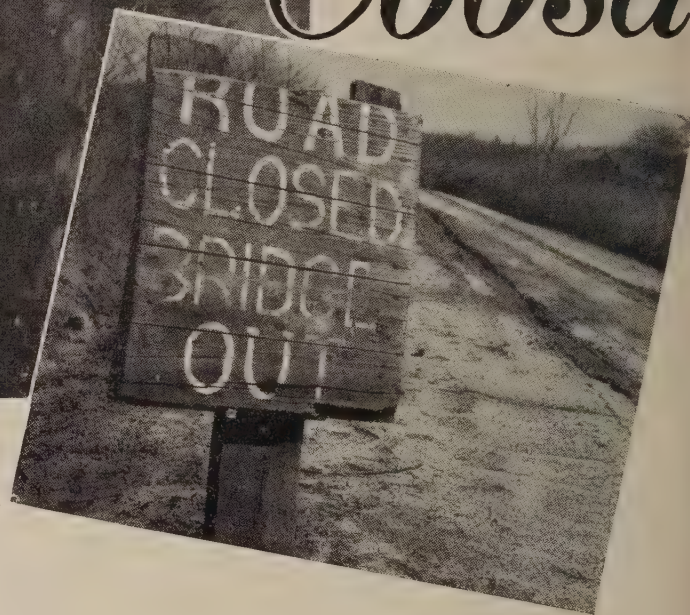
Desirable changes in customary leasing arrangements to accommodate conservation have not had the attention they deserve. This is particularly true in the cash-crop areas where soil and water

(Continued on page 107)

Calming the Waters OF THE Coosa



High-flood stage is indicated on tree by E. R. Daniel, engineer of the Coosa staff.



At right is a reminder of bridges washed out, roadbeds destroyed, in the Noonday Creek watershed.

By JOHN McKINNEY

"I saw chickens riding high on broken houses. Bobbing along on the swirling flood were trees, fence posts, bridge timbers. People were trying to pull drowned automobiles out of water that obscured the streets. I saw farmer's faces as they watched their rich bottomlands go under."



Alton Orr signs the first flood-control plan in the Coosa system.

THUS GOES the eye-witness account of Harry Veatch who for 8 years has seen again and again the disastrous effects of floods in those fertile valleys that nestle between the hills of northwest Georgia.

"If the water goes off by nightfall, she won't sour," one stout-hearted farmer predicted for his milk-stage corn. But sunset came, and murky water continued to rise, quietly souring the corn meant for cornmeal, for hogs, for cash: shoes, groceries, medicine, education; nullifying investments in seed, labor, equipment; destroying some of the best land.

On rich lowlands grass and clovers grew lush, even in hot, dry July and August. Here cows could graze and grow fat. But floods came. Cattle drowned or were stranded. Farmers went in boats to feed them.

"I saw hundreds of tons of soil carried by," Veatch declared. He had worked as district conservationist for the Soil Conservation Service at Rome, Ga., a city set where the Rivers Etowah and Oostanaula form the Coosa, which flows into



Roads contribute to silt and floods in the Noonday Creek watershed. This huge gully leads down from a culvert up there where the car is.

the Alabama, then into the Mobile, and finally into the Gulf.

Last year the Coosa River watershed above Rome was authorized by Congress as 1 of the 11 in the United States for Federal participation by the Department of Agriculture in establishing works of improvement to retard waterflow and prevent erosion in the interest of flood control. Technicians of the U. S. Department of Agriculture started at flood-ravaged Rome and trailed upstream to streamlets and gully heads, through red

mud, to tops of bleeding hills where raindrops spattered naked soil on the watershed rim. "Here," they agreed, "is where the problem begins."

The Soil Conservation Service selected Veatch to prepare flood control work plans beginning in the Noonday Creek sub-watershed, a critical contributor to the flood and sediment problem of the Coosa River watershed.

Near the mouth of Noonday Creek lives an old-timer of 80 years. "When I was a boy I had to swing down into Noonday on a grapevine when I went washin', but now, if I were younger, I could jump in without hurtin' myself."

NOTE.—The author is an information specialist, Soil Conservation Service, Spartanburg, S. C.



Gullies poured silt on roads, added roily waters to unruly Noonday Creek.

On the Noonday Creek watershed lives Mrs. Clara Anneberg, owner-occupant of the pre-Civil War Kirkpatrick Mill site. Mrs. Anneberg told us the mill had ground corn "for over a hundred years." We saw a silted reservoir growing marsh-reeds and alderbushes.

"When I bought in 1941," Mrs. Anneberg related, "on yonder side where you see that grass, there was a great deep hole. I used to catch fish out of it."

Along Noonday Creek we observed once-beautiful farming bottoms abandoned to bushes. Leaving their potentially best lands, the farmers had taken to the red hills where they were trying to eke out an existence on eroded slopes from which top soil had mostly washed downstream.

They pointed out that streams filled with debris made it impossible for channels to carry the run-off from even light downpours. Some channels had filled completely, creating swamps. Soil Conservation Service engineers estimate that Noonday Creek is filling up at a rate of 3 inches a year.

In 1919 farmers in this watershed spent \$41,000 to dredge and straighten 10 miles of channel. The cleaned channel has silted back, and then some.

We saw fertile loam sandwiched like cake-filling between original clay and sterile sand or stony wash. Standing on the wash, Farmer Clarence Kurtz observed, "When we moved here 39 years ago we could hardly climb down the creek banks but now the water overflows and gets into the barn."

Too often in Noonday Creek watershed we were ordered to stop by signs lettered: "Road closed—Bridge out."

Silt washed chiefly from raw gullies, roadside ditches, and galled areas. One farmer commented succinctly, "Grader-blades clean out the ditches, then here comes the rain."

Looking downstream, you get a view of Noonday Creek bottomland farming, more and more hazardous as one travels past many hundreds of acres of once-fine lands along the several hundred miles of meandering stream.

All along this route, the stream collects its toll. City people suffer along with farmers.

After essential surveys had been completed on the Noonday Creek watershed, a meeting was called by the Coosa Intra-Basin Committee of District Supervisors, made up of one supervisor from each of the four soil conservation districts involved and a fifth member at large. Attending also, were farmers, technicians of the Soil Conservation Service, county agents, foresters, county road commissioners, state highway representatives, and others.

In the end, a cooperative flood control plan was worked out for the 32,000 acres in the Noonday Creek watershed with the following objectives:

(1) Conversion to forest of 5,960 acres of severely eroded land now in crops, in pasture or idle.

(2) Establishment of pasture or perennials on 5,825 acres of land now in cultivation or idle.

(3) Clearing of 550 forest acres not subject to erosion, for use for clean-tilled crops.

(4) Stabilization of gullies and galled areas on 2,000 acres.

(5) Stabilization of cuts, fills, shoulders, and ditches on 40 miles of roads.

(6) Terracing, establishment of water-disposal systems, and installation of improved rotations on 4,200 acres.

(7) Improvement and maintenance of 1,200 acres of existing pastures.

(8) Snagging, bank clearing and stabilization of 20 miles of stream channel.

(9) Construction of small structures for regulating flood discharge where justified.

"Cultivation has moved back into the hills," says A. S. Booth, an SCS engineer. Several acres now are needed to grow what formerly grew on one acre of rich bottomland. The objective of the watershed improvement work is to reduce the damages from floods so that more use can again be made of the fertile bottomlands.

Agronomist John Brown recommends the use of kudzu with which to stabilize the miles of raw banks and adjoining gullies.

Forester Ellis F. Boyd figures that much of the area set aside for woodland will reseed naturally.

Coosa leaders are urging farmers to cooperate because of the direct benefits resulting to the land. They point to the value of improved bottom lands and the advantages of treating road banks, gullies,

galled areas, and stream banks to reduce flood damage in the future.

Alton Orr, a farmer in the Noonday Creek watershed, signed the first Coosa flood control conservation farm plan last February. His 53-acre farm, like most farms in Coosa's 2,572,800-acre watershed is small, but Orr is putting in a complete soil and water conservation program.

LAND TENURE

(Continued from page 103)

conservation may involve the introduction of grass farming and livestock enterprises. Obviously, changes of this nature require new types of leases or decided modifications in the provisions for sharing income and expenses, if tenants are to be interested in conservation. Cotton farmers, for instance, are not going to be interested in grass and livestock farming if their part in the farm returns is limited to the customary share of cotton. The aim should be to make soil conservation profitable to both tenants and land owners. Thus, by assuring tenants that they will receive a fair share of conservation benefits or the equivalent thereof, at least a part of the problem of conservation on tenant-operated farms can be solved.

WORTH UNTOLD SUMS.—"Since the organization of our Soil Conservation District in Green County I have learned more about soil and water conservation than ever before," writes L. W. Shirley, Greensburg, Ky. "The soil test is very helpful. It tells us when and how much to apply in the way of lime and fertilizer. The planning of rotations ahead of time surely is a big help. Contour cultivation is a big help in conserving soil and moisture, thus increasing yields.

"Some of the other things we are thinking about, now that we have a district: the production of fish from fishponds which also catch run-off, the production of timber as a crop, and the rearranging of fields and fences to save soil, time, and labor.

"On account of labor and equipment shortage I have failed to get all the soil conserving practices applied that I would like to have done. Since the war is over I hope to put every soil conservation method on my farm that should be there. From the soil conservation practices I now have I can see that the yields are already doubled.

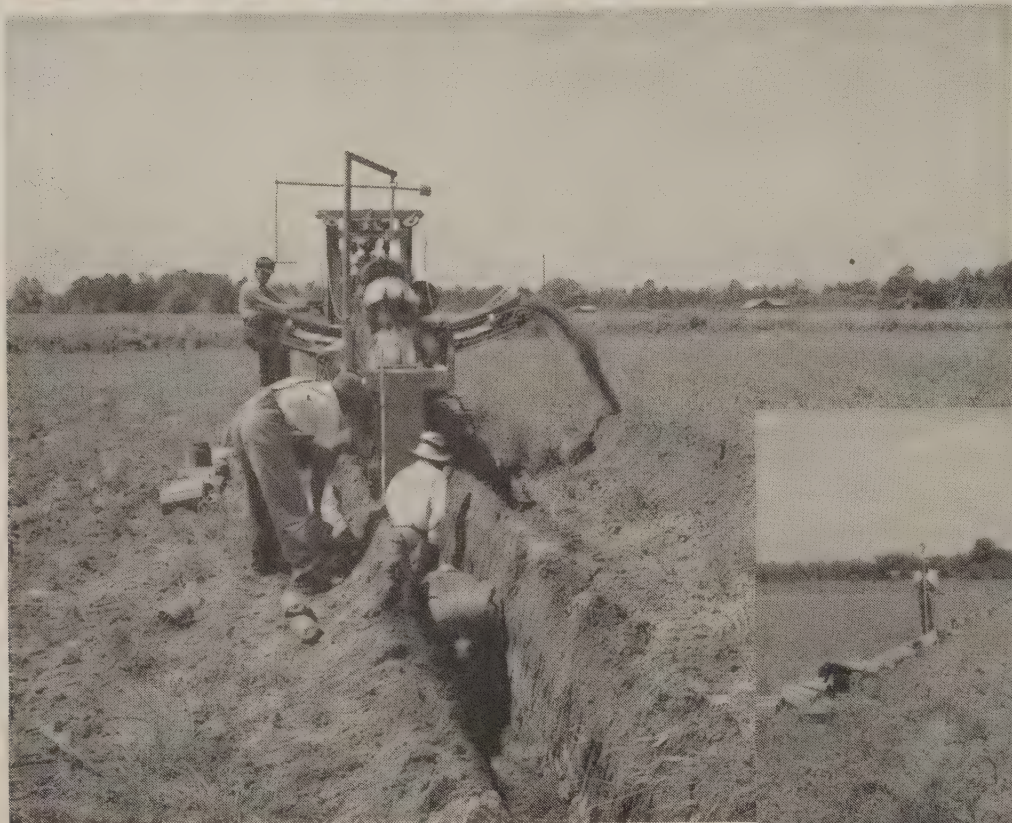
"I consider that some of the 'musts' of soil conservation are cover crops, green manure crops, good legumes and grasses for pasture and hay. Soil and water conservation are one of the major needs of our county. Farmers are beginning to come to us in the district organization and ask questions about soil and water conservation.

"In 1945 we contoured more acres of row crops and constructed more ponds, diversion ditches, and terraces than ever before.

"I am quite sure that the program of soil conservation will be worth untold sums to Green County. Good soil means more prosperous people, better churches, schools, homes, health. Why not conserve it?"

Conservation Pl

Tile d



Modern way to lay tile, to save land from drowning and make it most productive, is to put this trencher to work. It slices out a ditch 19 inches wide and up to 5½-feet deep.



The grade is established in advance by technicians from the Soil Conservation Service. Most of the pictures on these pages were taken on the farm of W. W. Eagles, Macclesfield, N. C.



John Henry Edwards, conservation aide, adjusts sight bar on steel guide stake. The best assurance of efficient drainage is sound and skilled technique.



It's like an assembly line—each crewman at his job—tile distributed up ahead, waiting for trench machine to knife through field. Hermann Postlethwaite took these pictures.

ns May Call for ainage



Drainage, like all farm operations, rests on careful planning. Soil scientist and drainage engineer here study the work to be done on the Berry Brothers' farm at Deep Creek, Va.



The machine is a bear for work. Its use makes it possible to lay from 2,000 to 3,800 feet of tile drainage line per day. Crew consists of operator, helper, and two tile-layers.



After tile is laid and joints covered, they are carefully fixed in place by a few shovelfuls of dirt; the major filling is done, as shown here, by a dozer attachment on a tractor.



Tile is laid by hand, the joints being covered by roofing paper to keep out the soil. The five-inch sections were being laid in the spring of 1947 on the Eagles farm.

HAY YIELD UP 300 PERCENT

By CLARENCE S. JONES

DR. H. H. ZEIGEL of Collbran, Colo., increased his hay yields by more than 300 percent within 4 years. In 1945 he put up 200 tons of good quality alfalfa-clover-grass hay from the same ranch that cut only 65 tons in 1942.

Collbran is a small town in the Plateau Valley about 45 miles east of Grand Junction, elevation 6,100 feet. The Valley derives its name from Plateau Creek, which heads 15 miles southeast of Collbran and empties into the Colorado River 20 miles to the west. It is surrounded by nearby mountain ranges on the north, south, and east.

Dr. Zeigel is director of the Plateau Valley Congregational Hospital at Collbran, and also is known as a mighty good farmer. When he is not busy at the hospital he can usually be found at one of his three ranches. The one he calls his Libby place is a 200-acre irrigated ranch 5 miles southeast of Collbran. It includes 145 acres of hay and small grain land and irrigated pasture. Dr. Zeigel bought this place in the spring of 1942, when about 80 acres of the flat bottom land were spotted with patches of foxtail, with cattails occupying the draws. Serious erosion was evident on the steeper slopes, the ditch system was poorly arranged, fertility was low, the improvements were poor and everything in general was in run-down condition. Only 65 tons of hay were put up this first year from two cuttings.

Dr. Ziegel, being a physician, analyzed the symptoms and prescribed a good heavy dose of soil conservation. But as there was no soil conservation district in Plateau Valley at that time he had to take his prescription to the conservation office in Grand Junction, 45 miles away. A few days later Service technicians and the county extension agent got together with Dr. Ziegel and looked the place over. A few test holes showed that the water table on about 80 acres of the bottom land ranged from 2 to 4 feet from the surface. This was reflected in a poor stand of alfalfa and an abundance of foxtail.

A soil and moisture conservation plan was prepared which outlined the conservation practices that Dr. Ziegel wanted to apply and the amount



Stack of "insurance" on Ziegel ranch.

of technical assistance needed. With this assistance he began to reorganize his irrigation system, putting the ditches on a proper grade, shortening the length of runs and picking up waste water, wherever possible, to be used again. By the installation of a 6-inch wooden stave pipe, 860 feet in length, he was able to pick up excess water on the south side of Grove Creek and syphon it across to the pasture on the north side where it was badly needed. To obtain constant control of the head of water in the ditches and to eliminate lots of shoveling, he installed prefabricated concrete checks or turnouts at ditch intersections.

The wet bottom land was planted to a mixture of grasses and clovers best suited to high water-table conditions. A special mixture was used on areas showing signs of excessive alkali. The mixtures included meadow fescue, smooth brome, timothy, red top, reed canary, alsike clover, ladino clover, red clover, and strawberry clover. Proper attention was also given to fertilizing, grazing management, and gully control.

Dr. Zeigel thought the demonstration plan was fine for a starter. But he decided to install some drainage ditches and he needed a dragline to do it. Also, it was inconvenient for him to obtain technical assistance from the Grand Junction office 45 miles away. He was even thinking of jobs that he would like to do on his other ranches. As he was an old-timer he knew that the production of the entire Valley was only half of what it should be. He knew of several other ranches in a condition similar to his own. In talking with several of his friends and neighbors he found a few who were interested in a soil conservation district to include the entire drainage area of the Valley.

NOTE.—The author is work unit conservationist, Soil Conservation Service, Collbran, Colo.

In 1943, therefore, the Plateau Valley Soil Conservation District, including over 396,000 acres, was organized. It was Dr. Zeigel who provided the \$18 for necessary legal notices and other expenses incidental to organization.

Soon after a technician was assigned to the district, a district plan was prepared. Under this plan soil scientists made a detailed study of the seepage on the Zeigel ranch to determine the feasibility of drainage. After completion of the drainage investigation, 4,200 linear feet of open drain ditch were cut, some with dragline and some by blasting; more irrigation ditches were built on proper grades, and more concrete checks were installed. The total ran to 2,725 feet of new field ditches and something over 18 concrete checks.

All available barnyard manure, plus 100 pounds of phosphate per acre, are now applied to the cropland each year. On hayland it is spread ahead of a springtooth harrow, but it is drilled in with fertilizer attachment at the time of seeding on grain land. This practice was first started in the fall of 1942.

Dr. Zeigel owned around 25 head of cattle and 300 sheep in 1942. Now he has over 100 head of cattle and 475 head of sheep. He shifts them from one ranch to another as feed and pasture conditions require. However, most of this number are run on public range during the summer.

No hay was sold from this ranch in 1942. From the 1945 crop 100 head of Dr. Zeigel's cattle were fed all winter and 100 tons were sold at \$20 per ton for feeding.

Many people are afraid to try the conservation way of farming because they cannot afford the extra cost. The Zeigel figures throw some light on this. The wooden syphon cost \$430, the drainage ditches \$627.78, and the concrete checks \$27. Phosphate for 145 acres cost about \$435 per year, or \$1,305 in 3 years. This makes a total cost of \$2,389.78, with the phosphate cost being spread over a period of 3 years. The AAA payments Dr. Zeigel received amounted to about two-thirds the cost of phosphate and about one-third of the other expenditures. This leaves a total net cost to Dr. Zeigel of about \$1,158. The yield of hay alone for 1945 was 135 tons more than was produced in 1942. This additional hay was worth \$2,500, although only \$2,000 worth of it was actually sold. The remainder was put into an additional 75 head of cattle above the number kept in 1942, with one stack being held over for reserve. Dr. Zeigel calls

this his insurance. In comparing these figures it should be remembered that the total cost is considered for the 3-year period, while the increased production is figured for the 1 year, 1945. Actually there was an increase in production of grain in 1945 and of both grain and hay in 1943 and 1944.

Other conservation practices projected for this ranch include leveling, completion of the drainage system, weed control, construction of a fishpond, and further improvements of the irrigation system to better utilize the water from the drainage ditches for irrigation. Bromegrass will be planted with new seedings of alfalfa for erosion control and to maintain a high level of organic matter in the soil. Desirable irrigated pastures will be included in the regular rotation system.

A few management factors that Zeigel considers important in increasing production are as fol-

(Continued on page 113)



Concrete turn-outs save labor and get better control of water.



Mr. and Mrs. Tolliver check farm records, a pleasant task.

4 Years' TRANSFORMATION

By O. L. PUTMAN

THERE ARE TWO remarkable things about Lewis Tolliver's 40-acre farm southwest of Ratliff City, Okla. First, just 4 years ago it was so badly eroded and run-down that it produced scarcely 5 bushels of corn per acre. Second, in the front yard of the farmstead stands a redbud tree that has white blossoms, a plant rarity.

Thousands flock to the Tolliver farm every year to see the rare white blooms. Many of these sight-seers become customers, returning each season to buy fruit, berries, grapes, and garden truck.

"I always wanted to buy a run-down place that I could build up," Tolliver explained. "I couldn't afford it until 4 years ago when I bought this place. It had been cultivated to corn, sorghum,

NOTE.—The author is District Conservationist, Soil Conservation Service, Ardmore, Okla.



Tolliver prunes a tree in terraced orchard.

and peanuts for many years but when I bought it there was hardly any production at all. It had gullies that I couldn't cross with implements. The gullies are now practically gone, production is up and I figure the farm is already worth twice as much as I paid for it."

Shortly after he acquired the place, Tolliver entered into an agreement with the Arbuckle Soil Conservation District to carry out an integrated conservation program. He terraced and contoured the 22 cultivated acres. He alternates two rows of corn with a row of blackeye or stock peas, alternates cotton and peas in the same proportion, and plants hairy vetch for a winter cover crop to enrich the soil and protect it against erosion. He cuts the vetch into the soil in the spring. He uses vetch, also, in his terraced orchard of apples, apricots, peaches and plums. He fertilizes with superphosphate, spreading barnyard manure on the thinner spots.

Tolliver's conservation plan also provides for the improvement of his 18-acre pasture by clearing and regular mowing. With little bluestem as the basic grass, the pasture is grazed only in the winter. The rest of the year Tolliver turns his cattle, 7 cows and their calves and a bull, into a 190-acre pasture which he leases. He has a tidy income from the sale of cream.

Tolliver expects to add pigs to his farm enterprise as soon as his corn production moves into high gear. His formula for making profitable a run-down farm is this: "First you must have a real interest in the land; then you need enough persistence to do the necessary conservation work."

HAY FIELD UP 300 PERCENT

(Continued from page 111)

lows: (1) Sufficient labor and machinery to do the various jobs when they should be done, (2) moderate application of irrigation water, (3) prevention of waste-water loss, (4) elimination of injury to hay stands by avoiding close grazing in spring and fall, and (5) keeping good stands of hay at all times through new seedings, or drilling in a few pounds of red clover in old stands, with phosphate in the fertilizer attachment. Zeigel believes that it doesn't cost any more to farm the right way than to farm the wrong way.

Improvements on this ranch have by no means been confined to the land alone. The house was worked over inside and out, and a new granary and

toolshed built. A new feedshed, with concrete foundation, was erected. Plenty of headaches were encountered because this last job was done in sub-zero weather, but that was the only time labor was available. The total cost of the structure was \$1,600, which Zeigel estimates as probably \$400 more than it would have cost to build during favorable weather conditions. However, he figures that the labor saved in feeding, better utilization of hay, and the protection afforded to the livestock will soon off-set this extra cost. It is an automatic affair, or self-feeder, that will accommodate around 200 head of cattle. The feed bin will hold from 100 to 125 tons of chopped hay; the funnel is shaped at the bottom to allow self-feeding into the bunks which extend all the way around three sides. These three sides are protected by sheds, the north side being closed and the others open.

Next to be contemplated was equipment for picking up hay from the windrow, chopping it in the field, and loading into trucks or wagons to be hauled to the shed and elevated into the bin, another prospective big saving in labor.

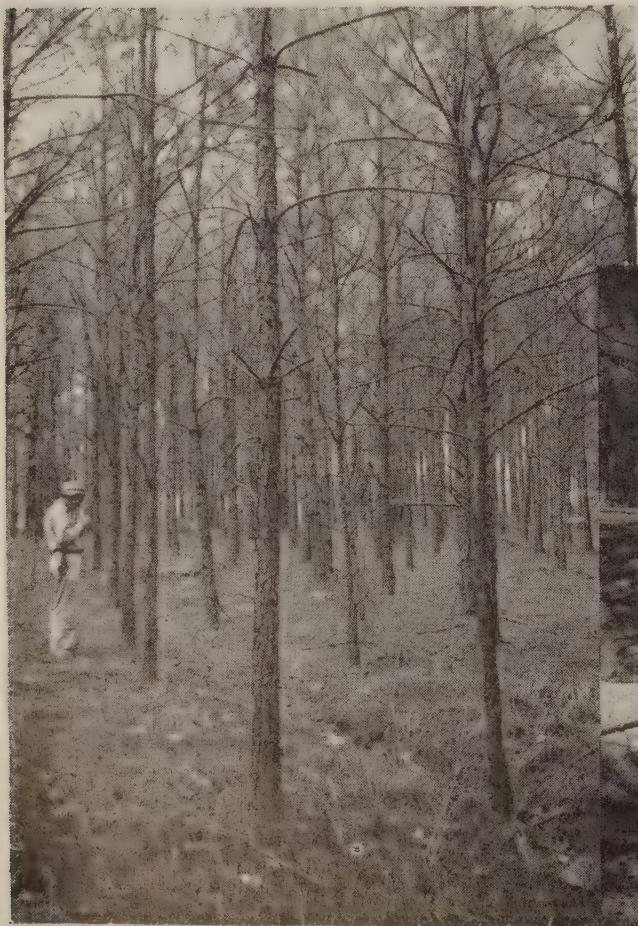
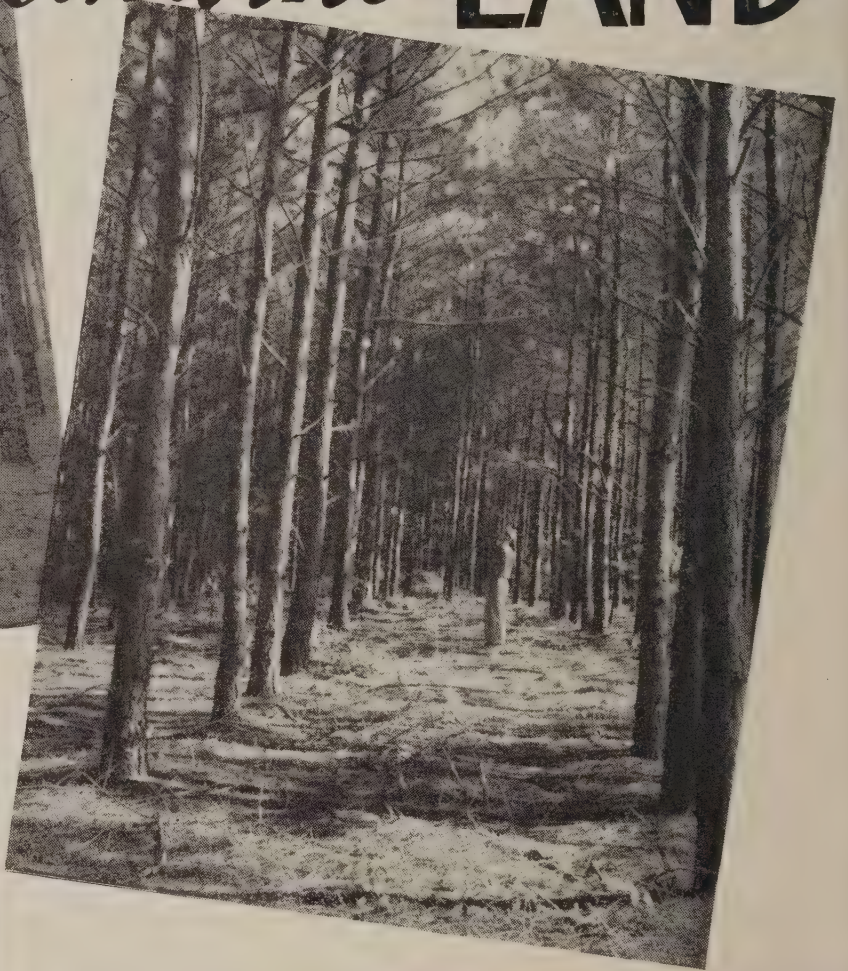
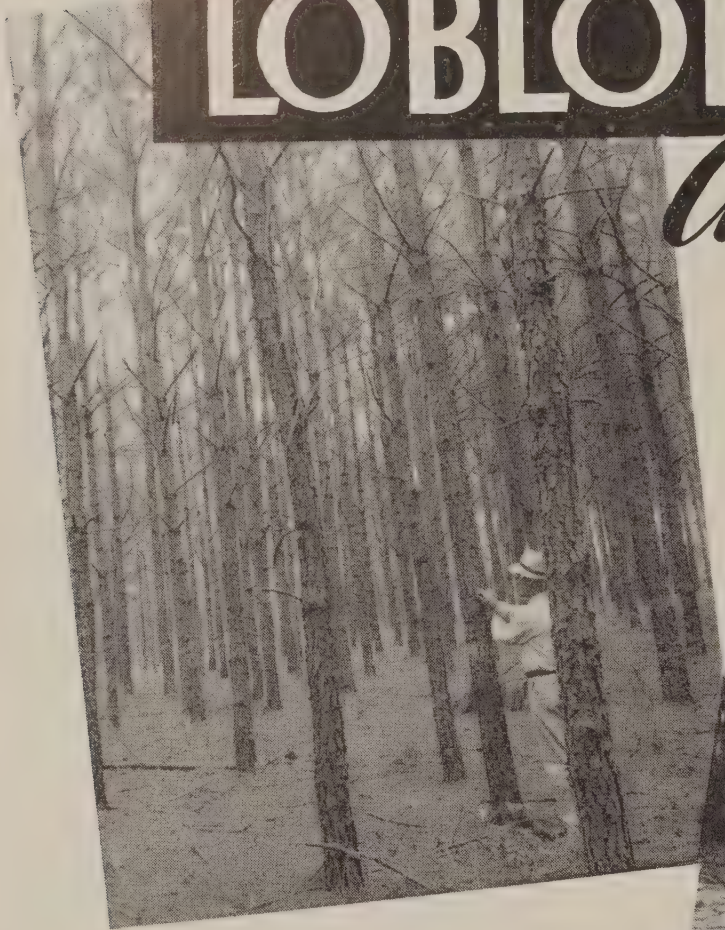
Another conservation plan was prepared for the Zeigel ranch north of Collbran, last year. With technical assistance provided through the local soil conservation district, Zeigel replaced an old leaky, 7-inch wooden syphon with a new 12-inch transits syphon, 1,016 feet in length. The location of the syphon was changed, and about 500 feet of ditch were eliminated. Zeigel says that being limited to the amount of water that will flow through the syphon is a great advantage, for he doesn't have to worry about his operator washing the place away, or leaching out the minerals by trying to store enough high water in the soil to tide over periods of short water.

Zeigel is now talking about treating fence posts to make them last longer, and local soil conservationists won't be surprised if they hear that he is breeding his cattle by artificial insemination, or using his physician's hypodermic needle to inject hormones into some of his crops.

WHAT HAS IT DONE FOR YOU? Among the most interesting items in recent issues have been the "shorts" telling actual experiences of farmers with soil conservation. Crop yields up? Income increased? Farm permanently safeguarded? We want a lot of these meaty tales from our readers or their friends. We can use 100 to 400 words per item. We can pay only in terms of gratitude, and the knowledge of a good turn done the cause. Address all letters to Wellington Brink, Editor.

LOBLOLLIES

And the LAND



ROSS CUNNINGHAM, of Waterloo, S. C., gave Rosemont, his ancestral plantation, a Christmas present in 1930. Almost as soon as he came into possession of the home place, following the death of his father, he began to plan a new cropping system. He planted pines.

In those days, the planting of pine trees was something new in Laurens County. He first talked over his idea with C. B. Cannon, county agent. They decided on loblolly to replace the then low-priced, and consequently unpopular, cotton. That fall, after cotton harvest, planting of year-old loblolly pine seedlings began. Approximately 200 acres were set aside for them. The trees were set out in 8-foot rows, on the contour, and about 6 feet apart in the row. The first field was completed by Christmas.

The field that was planted had many classes of land. In 1947, a little over 16 years later, a series of tree measurements was made on class areas involving four land classes. This article reports what was found.

In the 8 land classes recognized by the Soil Conservation Service, the major factors which distinguish one class from another are kind of soil, steepness of slope, and degree of erosion damage. Further, the kinds of soil are influenced for use by the depth, the texture of surface layer, and the permeability of surface and subsoil layers.

The soil found to have the largest acreage in the plantation was Helena-Vance. Four plot measurements were made on this soil. The other soil found was Cecil, an old Piedmont stand-by. However, the latter had a subsoil somewhat tougher than usual. Two plots were chosen in the Cecil.

NOTE.—The authors are respectively, soil scientist, Soil Conservation Service, and conservationist, Forest Service.

THE PICTURES

Top, left.—Loblolly pines on Class II land, Rosemont Plantation, Laurens County, S. C. Helena-Vance soil, 3-percent slope, slight erosion.

Top, right.—Here's how they grow on Rosemont's Class III land. Helena-Vance soil, 6-percent slope, moderate erosion.

Lower, left.—Performance on Rosemont's Class IV land. Helena-Vance soil, 12-percent slope, severe erosion.

Lower, right.—Stage reached on Class VII land. Helena-Vance soil, 17-percent slope, very severe erosion.

For the reader unfamiliar with Piedmont soils, the following description of Helena-Vance soil unit is taken from the land capability table for the Laurens County Soil Conservation District: "Moderately deep to deep, moderately light textured, slowly permeable, mottled, semiplastic upland soil."

With the same kind of soil in each of the four Helena-Vance plots, the separation into different land classes naturally was determined by the various slope and erosion conditions. The Class II area was smoothly sloping and only slightly eroded. The Class VII area was steep and very severely eroded, with many deep gullies. The Class III and the Class IV lands were intermediate.

Every tree within each selected tenth-acre plot was tallied as to breast-high, diameter, height, and diameter increment. A summary follows:

	Land Class ¹ (Helena-Vance soil)				Land Class ² (Cecil soil)	
	II	III	IV	VII	II	VII
Survival percent.....	77	61	67	40	65	34
Present trees per acre.....	700	550	610	360	590	310
Average diameter, in.....	5.97	6.62	4.94	4.33	6.54	4.54
Total diameter per acre, in.....	4,177	3,643	3,012	1,559	3,859	1,408
Basal area per acre, sq. ft.....	142.4	136.5	90.1	49.9	142.1	42.0
Average height, feet.....	45	42	34	28	46	25
Volume, cu. ft. per acre.....	2,143	1,899	1,039	494	2,153	364
Volume, cords per acre.....	26.8	23.7	13.0	6.2	26.9	4.6
Growth rate, cds./ac./yr.....	1.7	1.5	0.8	0.4	1.7	0.3
Present value (@ \$2.00/cd.).....	53.60	47.40	26.00	12.20	53.80	9.20
Date diameter growth slowed.....	1940	1941	1941	1943	1941	1943

¹ The Class II land had 3% slope and only slight erosion; the Class III, 6% slope and moderate erosion; the Class IV, 12% slope and very severe erosion; and the Class VII, 17% slope and very severe erosion.

² The Class II land had a 2% slope and only slight erosion and the Class VII, 12% slope and very severe erosion.

These data indicate that the land-class separation is a valid one for predicting the relative volume growth of planted trees. In each tabulation, whether for survival percent, diameter, height, or volume of wood, it was found that, with only minor exceptions, the tree growth corresponded to the land class. The better the land class, the better the tree growth.

REPORT FROM A BANKER.—"The actual dollar enhancement of many of the farms we have observed is just impossible to estimate," writes Robert W. Crouse, farmer and banker of Dry Run, Pa. "At one time our Committee declined a \$3,000 mortgage on one of the farms on which you have done extensive work within the past two years because of the limited potentialities due to serious erosion problems. We feel those practices now being employed have definitely curtailed and improved the situation to such an extent that a \$4,000 mortgage would be readily approved."



By O. J. McDougal

DO YOU REALIZE that a farm is a factory? With soil, seed and livestock, it makes meat, grain, and milk—new materials and new wealth created through the efforts of man and machine.

A successful manufacturer must arrange his plant efficiently, must use each part within its rated capacity, and must keep up with repairs. The tractor-maker doesn't use his office building for a foundry, or a foundry for his assembly line.

On his 160-acre farm south of Weeping Water, Nebr., Lloyd Ranney knows all about this. He is applying business principles—and they are paying off. His crop production is up 20 percent, and his beef cattle have increased from 10 to 15 head.

Ranney began his present system of farming 4 years ago, when he started cooperation with the Cass County Soil Conservation District. He now has the conservation plan, which Soil Conservation Service technicians helped him develop, almost fully established on the land.

"My only regret," Ranney says, "is that I didn't start sooner. Soil and moisture losses can't be calculated in dollars and cents, I know, but they were considerable. Biggest damage was the removal of quite a bit of topsoil by sheet erosion, and gullying which was pretty bad in places.

"I am getting more grain from fewer acres. Those 'extra acres' are in brome grass, sweet clover and alfalfa as part of the crop rotation. The soil is being improved and there is more roughage for cattle."

Analysis of the farm and a map showing in colors the capabilities of the different parts were made by a Soil Conservation Service soil scientist, who examined the land for soil types, degree of slope and amount of erosion damage.

The map is actually the blueprint of the farm. It became Ranney's guide. He and the Soil Conservation Service technician talked things over. They went over the farm and checked it with the map. Then, together, they worked out the con-



Brome grass is in irregular-width buffer strips which take up the point rows in Ranney's contoured, terraced fields.

NOTE.—The author is an extension conservationist, University of Nebraska, Lincoln, Nebr.



Lloyd Ranney increased his corn yields 15 to 20 bushels per acre by conservation practices. When he completes his terraces and related practices, he will have his soil "fenced in" just the same as his livestock. With him, at the right, is E. T. Stacey, technician of the Soil Conservation Service.

servation plan—the use to be made of the different parts and the treatment each part needed to keep it in repair. The technician also helped apply the plan.

Ranney's farm is an unusually good illustration, because five of the eight capability classes are represented.

Ten and one-half acres are Class II and 62½ acres are Class III. These are the crop department. But they need waterways, contouring, terraces, improved rotations to keep them in repair. How much is needed depends on the kind of land.

Thirty-seven acres are Class IV. This is a "stand-by" part. It is land that can be cropped,

but it requires so much intensive conservation treatment to keep it in repair that it is better kept in grass most of the time. But it is therefor emergency cropping.

Fourteen acres are Class V, and 16 acres Class VI, which is land that always should be kept in grass or trees. They are the grazing and wood products departments. Each is rated as to capacity for use. Classes VII and VIII, not found in Ranney's farm, have the lowest use capacity. In fact, Class VIII has no agricultural use, but is good for wildlife.

Now let's see how Ranney uses his land. Cropland totals 93 acres—his Class II and III land.

Pasture amounts to 46 acres, meadow is 8 acres, and 5 acres are in woodland. Farm buildings, lots and roads take up 8 acres.

"It has taken some rearrangement of fields and quite a lot of work to get the farm lined up this way," Ranney commented. "I still have some terraces to build. But when I get them built, I'll have the soil fenced in just like I fence my livestock."

"Does it pay?" he continued. "Well, let's look at my corn yields. Last year I got 70 bushels per acre, contrasted to 50 bushels which neighboring farmers got farming up and downhill. And in 1945, my yield was 55 bushels, compared with 40 bushels in the neighborhood's up-and-down fields."

He went on to explain that he harvested 1,200 pounds of bromegrass seed from 4 acres in waterways, buffer strips and point rows. He sold it uncleaned for 15 cents a pound.

"In addition," Ranney said, "the larger amount of roughage has upped my livestock production.

I now have 15 head of purebred Herefords, instead of 10 grade animals. That's a 50 percent gain in number.

"The cattle use the bromegrass in the waterways and buffer strips for winter pasture, and need little grain. Yet, they stay in good condition. In spring, winter, and fall, they use bromegrass and alfalfa along with other pasture. As a result, I have less protein feed to buy."

Altogether, Ranney estimates his over-all production is up more than 25 percent. In production, that's like adding 40 acres to the farm. In practice, it's cheaper, because he didn't have to invest in more land or go to the expense of farming more acres.

It is the result, Raney explains, of doing what any factory operator would be expected to do—getting a blueprint of the plant and following it. His crop department is where it should be. So is his grazing land. And he knows what to do to keep the plant in repair.



Father-Son Team *Remakes Farm*

By RALPH D. BRANAN

GEORGE D. GOBER bought his 75-acre farm in Madison County, Ga., sight unseen. At least he hadn't seen it since he was a boy.

"It was a jim dandy place when I was a kid," he recalled.

But the morning he went to the farm after buying it, "I had a hundred and one notions of not moving on it." The farm he remembered as

a "jim dandy" was eroded and run-down. "Little old corn in August," Gober said, measuring with his hand just above his knee," amounted to practically nothing."

That was the kind of farm he bought in 1943, but it isn't the kind of farm he has now. Today the place is more as it was when he was a youngster.

So well has Gober healed and improved his land that he was one of 20 Madison County farmers who received soil conservation certificates of merit

NOTE.—The author is acting work unit conservationist, Soil Conservation Service, Danielsville, Ga.



Strip cropping helped to snap up production on a once-run-down farm.

from the Georgia Bankers Association recently. He started his complete soil conservation program soon after he bought the farm, with help from Soil Conservation Service technicians in the Broad River Soil Conservation District.

Your first glimpse of the Gober farm from the main road shows you a field systematically strip cropped, and with the terraces well-maintained.

Then you round a curve to see the Gober home.

Shrubbery is around the bungalow, and oak trees at the side. Grass and lespedeza, neatly trimmed, are in the yard. At the right is a modern chicken building. From the hillside comes the sound of hoes, hoeing cotton freshly plowed and unusually good. To the left of the house are two permanent sericea strips and a meadow strip of kudzu.

Mrs. Gober was working with milk and butter, listening to the radio. Her husband, she said, was plowing the new cane patch.

"Syrup was two and a half a gallon last year, and I've got my own cane patch this year," Gober said.

Then we asked about the work for which he received a certificate of merit.

Gober stepped back in the shade of a persimmon tree, and we followed, thinking that here would be a swell place to tree a possum this fall.

"My yields have gone up a lot since I moved here in 1943", Gober said.

"The first year I had 16 or 17 acres in cotton and made 9 bales; last year, 13 acres in cotton and 10 bales. The first year I made hardly any oats at all; around 20 bushels per acre. This year, and it was my first year without nitrate of soda, I made 70 bushels. It was the same land that was in oats in 1943."

Although the corn yields have been doubled, Gober has just about quit growing corn. He has only 3 acres in corn now, depends on small grain for feed.

And soil conservation farming has paid. In 1943 the gross income from this 75-acre farm was less than \$500; in 1946 it was \$3,195 "and not all the increase was from better prices; most of it was from soil conservation."



Even the garden is on contour.

Good rotations of oats followed by annual lespedeza, cotton, oats, and volunteer lespedeza have largely been responsible for the increased yields, the young farmer said. But the rotations have been supported by a water disposal system that includes broad-based channel-type terraces and meadow strips, contour cultivation, and fertilization. On most cropland, the rotations are in contour strips, with banks of oats and lespedeza alternating with strips of cotton or corn.

"If the terraces are far enough apart, I'm a fool about strip cropping," Gober admitted. "If the terraces are close together or if the land is pretty steep I'd rather plant solid to grain and lespedeza."

The land is prepared, planted, and cultivated with tractor-drawn equipment. There's not a mule on the place. Gober said he'd like to have a combine to harvest the oats, but that on a small farm he believed it was cheaper to pay a neighbor to combine the small grain.

When we asked him what he thought about cotton, he came back with: "I like cotton to an extent, but I like to mix it."

And "mix it" he does, with pastures, meadows, dairy cows, poultry, and small grain.

"I didn't have much of a pasture to begin with," Mr. Gober said. "But it's pretty good now; fertilized it twice with 18 percent phosphate; and put out 10 tons of lime. I'm going to sow some sericea lespedeza in my permanent pasture."

Kudzu, which was disked thoroughly this spring, has covered the plow marks and will be ready for grazing soon.

"I have three milk cows, one a purebred Jersey," Gober said. "We sell buttermilk and butter in

Commerce. I want to get enough cows so that the milk route will switch by my place. I have some more acres that I aim to put in something else, and I can certainly use it for pasture. If a piece of land is too steep for a tractor it must be in something else."

Then Gober started talking about their 16-year-old son Roger.

"He just messes around and clears more money than I do in 12 months," the proud father exclaimed. "Last year I gave him a 3-acre cotton patch. He side-dressed his cotton a little before I did and made 5 bales.

In their home the Gobers have an electric churn, a refrigerator, radio, electric lights, and an electric iron. And 400 or 500 quarts of home-canned food every fall. In the freezer locker at Commerce the Gobers have a whole hog, beef, peaches, and strawberries.

72 LUSTY ACRES.—Five years ago I moved to a very steep farm consisting of 240 acres, of which 83 acres are tillable," says Glenn Schaltz, Huston, Minn., farmer.

"This farm was contour stripped a few years before I came, but it had been badly eroded before that, and there were still some bad ditches that were nearly impossible to cross with machinery. Now after the last 5 years of contour farming no sign of any ditches remain, and by the use of clover, lime and alfalfa rotation, our side hill strips have improved to the extent that the last two years it has been nearly impossible not to raise oats, as last year even Vicland oats lodged on some of the strips. This was land that 10 years ago would not even raise oats.

"From the 72 acres that are cropped each year we now keep a milking herd of 20 Swiss cows, and about 10 heifers, have 350 laying hens, and raise about 50 or 60 hogs per year. This amount of stock is probably double the amount that was kept before starting soil conservation."

THREE YEARS' PROGRESS.—"On my farm," writes C. L. Satterwhite, of the Grant County Soil Conservation District, Jonesville, Ky., "by putting into use the practices recommended to me by our farm planner, which includes proper selection of cropland, constructing diversion ditches and terraces, contour planting, pasture management, and proper use of phosphate, lime, complete fertilizer and manure, I was able to increase production of tobacco from 1,124 pounds per acre in 1942 to 1,830 pounds per acre in 1945, the production of hay from 1 ton per acre in 1942 to 2 tons of hay per acre in 1945. The carrying capacity of my pastures in 1942 was 5 cows, 2 horses and 50 ewes; in 1945 they produced pasture for 5 cows, 2 horses and 94 ewes, with grazing nowhere near as close as before.

"The crying need is for this work to be done with much greater speed than has ever been accomplished if we expect to increase our standard of living, maintain our farms and keep this Nation secure."

UPSURGE OF COMMUNITY.—"I would like to tell you some of the things the South Logan County Soil Conservation District has done in my community," writes E. C. Price, of Russellville, Ky.

"I have a neighbor who paid \$1,500 in 1936 for a 300-acre farm which had 50 acres in cropland, and the rest in bushes and woods. By 1942 this man had terraced, limed and phosphated to the point where he had 150 acres of crop land, and every acre a producer. But when he started he had fields which had been worthless and abandoned so long that the bushes had grown 20 feet tall, and he had one field with gullies so deep that you couldn't drive a corn planter over them. This deep-gullied field was terraced, limed, and phosphated in 1942 and sowed to a mixture of red clover and orchard grass. In 1943 he harvested 2½ tons of red clover and orchard grass hay per acre, plus 2½ bushels of red clover seed to the acre. In 1944 this field was pastured. In 1945 it made more than 48 bushels of corn per acre.

"In 1942 a certain untreated field of mine produced 6 barrels of corn per acre. (A barrel is equal to four bushels of corn untreated, or six de-germed bushels.) Then I terraced this field and sowed it to a mixture of grass and Korean lespedeza. In 1945 I planted it to corn and made 10 barrels to the acre. Before I terraced this field had a steep gully. Now it has almost disappeared.

"I am glad I live in a community where there is a soil conservation district because I know it is making a better place for us to live and also a better place for the next generation."

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TOBACCO CROP DOUBLED



CONSERVATION REPORT FROM KENTUCKY.—"Tobacco yields have increased from 800 pounds per acre to 1,700 pounds per acre in a normal year," writes S. A. White, Adairsville, Ky. "Corn has increased from 20 bushels per acre to 50-60. . . . Hay and pasture yields are consistently high.

"The thing that makes me take pleasure is the fact that we are just in the beginning of our program and can see heartening results. Much more can be accomplished."

THE SOIL COMES FIRST.—"The old farm through soil conservation practices is coming back," writes Howard Gray, Clarkesville, Ark. "We are going to make a living on the farm. Junior is going to have a home and will not have to work in a filing station. In 1945 a tornado hit my farm. It wrecked my home, destroyed the outbuildings and a portion of the orchard. Then, this last fall I was in the middle of a half-mile wide hailstorm that broke out the window lights and ruined the roof of my house. It did damage to the orchard trees, stripped the seed from the lespedeza seed patch—everything hits me—but by all that's good and bad we are saving the soil. If we have soil we can build back the buildings and grow new orchards."

SWELL IDEA.—For the price of one dollar each, some of our readers are giving subscriptions to Soil Conservation Magazine as Christmas presents. A monthly reminder of good fellowship.

FRONT COVER.—Those who love the beauty of the sea should also appreciate the rounded waves of fresh-turned dirt on these corn lands of Nebraska.



Planting is being done on a diversion terrace; slope, approximately 12 percent. Conservation farming paints a new landscape on hundreds of thousands of midwestern acres. Photo by B. C. McLean.

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WELLINGTON BRINK

Editor

Art Work by

W. HOWARD MARTIN

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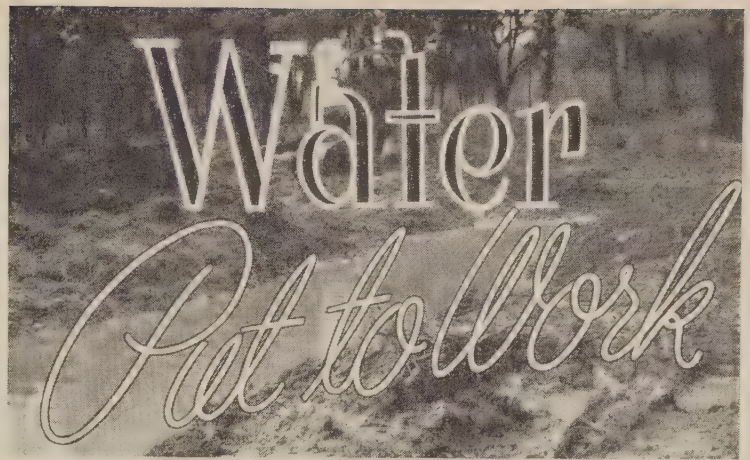
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WATER is the No. 1 problem on many a farm. Millions of fertile acres do not produce today because they are too wet or too dry or—alternately—both. But modern techniques of water conservation and management have shown us what to do.

The new science came to 3 million acres in South Carolina. There, where production had never been safe, the land responded with a bang.

The new techniques include a lot of ingenious devices you probably never heard of in all your born days. They are used separately, or in combination, to suit the situation. They have become the very crux of most of the farm plans now being written in the Charleston and the Georgetown-Williamsburg Soil Conservation Districts. And they are getting a terrific workout down there in the Low Country.

A few weeks ago I visited this area at the urging of Hugh Bennett. The Chief of the Soil Conservation Service makes it his business to conserve farm water along with farm soil. Thanks to the



tip, I saw a convincing demonstration of how water can be controlled and put to work.

The Low Country has to cope with irregular weather, and with fields that are close to sea level. Three months of rain alternate with long stretches of clear skies. Water management's task is to rush "excess" water off the land and later, in many instances, to redistribute it, an inch or a fraction of an inch at a time during dry spells.

On some farms the technicians virtually put the water table on a hoist, raising or lowering it almost at will. On others, they provide a gridwork of drainage ditches and a battery of pumps which



Automatic wooden tidal gate in freshwater spilling basin. Of cypress construction, gates like this were used 150 to 200 years ago on the old rice plantations, in connection with gravity and flood irrigation. Thus far, they have not been bettered.

speed heavy downpours off the fields and into the sea. Here and there they locate tidal gates to let sweet water off and keep salt water out. Large main canals are used not only for drainage but also for storage. Now and then, dikes are erected along the coast as defenses against tide and storm. There are elaborate systems of reservoirs and of surface, subway and overhead irrigation. There are tile drains, deep and shallow wells, open ditches.

Clearing the land is no small undertaking in itself. It's done on a grand scale. Sizeable trees topple under the grim fury of bulldozer, and smoke from burning brushpiles can be seen many miles away.

The districts bring in Soil Conservation Service technicians to analyze, plan and follow through. The districts also see that contracts are drawn

properly, that needed equipment is made available, and that maintenance is provided.

Let's visit a few plantations, with Remo Molinolari as our guide. "Moli" is a crack engineer, as expert in human relations as in hydraulics. He's district conservationist.

First stop is Scottswood plantation, which a few months ago was a great shallow lake due to lack of outlets. It is typical of the 70,000-acre "frog hollow" section of Lanes Community, Williamsburg County.

Two Junes ago Scottswood's 5,000 turkeys were pounded by rains that had them roosting in trees or clawing for foothold on a few exposed knolls. All but 50 of the farm's 7,000 acres were waterlogged, and they stayed that way until the district moved in with SCS technicians. The technicians were rubber-booted, courageous, and imaginative.



Almost unbelievable are the feats of the bulldozer. This toppling pine characterizes the high-powered clearing being done in the Low Country as a prerequisite to drainage, irrigation and land-preparation. This bit of action was on the farm of T. W. Thornhill, in the Charleston County Soil Conservation District.



The author's camera, late in the afternoon of the visit to Estherville, captured this swamp fairyland through a dining-room window. The moss-hung liveoaks and the big-footed cypress border a long, meandering and ancient lake from which has come many a record bass.

They waded knee-deep, even hip-deep, to make surveys and run accurate drainage lines. Then they called, for draglines, gouged out 50,000 cubic yards of main canal, laterals, and ditches, and kicked the extra water into Ox Swamp. It cost not more than \$14 per acre to set the farm free. Oliver Iselin, owner, was so happy that he celebrated by putting on carpet slippers and walking across his entire place to show everyone that it was dry!

Drainage merely set the stage. It made possible the development of a complete farm plan. For generations Scottswood had been the largely unchallenged domain of fox, rabbit, and hoot owl. Now those rich, mellow, sandy loams—capable of growing almost anything—were ready for work. Attention shifted to such matters as fire lanes,

brush-clearing, selective cutting of trees, rotations, liming, and fertilizing. Fields of truly virgin soil could now be plowed and put in shape. Scottswood's improvements are now bringing bumper crops of corn, cotton, Sudan grass, tobacco, fowl, butterfat, and red meat. Still better, the gains can be held and the improvements made permanent. It all started with the new wrinkles in water management.

Scientific planning is fundamental. Bad ditching can hold back a farm. But good ditching can spur it along to full and continued production. Nowhere else is this better illustrated than on the adjoining farms of M. L. Few, J. E. Pettigrew, Jr., and D. C. Brown, which lie 10 miles out of Kingstree.

On Few's farm I saw one of the old ditches, a



Drumsticks and whitemeat on the hoof. These turkeys are making weight on small grain and annual lespedeza; Scottswood.

small crease with an effective depth of only 18 inches. Close to it is one of the new man-sized ditches 6 to 7 feet deep. Comprehensive planning enabled Few to continue with both cattle and row crops without sacrifice of either. In the 5 years he had owned the place there were times when it was almost entirely flooded. Properly drained, however, the old acres on higher ground are safe, and they have been joined in safety and productivity by 300 additional acres. Tobacco wilt has almost disappeared. Winter grazing has cut down the feed bill. The black Angus herd has increased from 40 to 75. Sale of timber to pulp mills has almost paid for clearing. *Crotalaria spectabilis*—resistant to nematodes—has earned itself a niche in the tobacco-soil-building scheme.

Water technicians attach importance to the factor of convenience. Few benefits from this. On his farm there are 20,000 linear feet of farm ditches and 5,000 feet of main canals. One of the latter is graded east, the other west, with a bit of low plateau between. The lay-out is arranged in square blocks of 15 to 20 acres each, not too small and not too large. Fencing is facilitated. Few can plant or cultivate all day long with little interruption or delay. Farm roads and bridges are adjusted to the requirements of drainage, machinery, and farm operations.

Few's drainage system extends right across the farms of Pettigrew and Brown. You can do that kind of thing in the districts.

Most phenomenal of all is the water handling on Greenfield plantations, not far from George-



Portable sprinkling on the Osgard Hamlin farm. It makes possible two or three additional pickings of cucumbers.



Among the Low Country's brilliant feats in water conservation and management is the excavation of great reservoirs for storage and irrigation. This one is near Mount Pleasant, S. C.



Remo Molinolari takes a look at the young corn growing on soil (seashells and all) pumped from Winyah Bay 2 years previously; Estherville plantation.



This is virgin land on the Scottswood Plantation, now drained and going under the plow for the first time.

town. Dependable water and dangerous water are harnessed to the same wagon. On this farm an inch or two of moisture either way can make or break a crop. Greenfield's land is rich but it is also nervous and temperamental. And the seasons are tricky.

Three hundred acres have been cleared of trees and brush, drained, and put to work making corn, small grains, and hay for a herd of Herefords. Fertilizer is needed generally. Some fields, especially those that have been under water a long time, require heavy liming and fertilization: 2 tons of lime, 100 pounds muriate of potash, 600 pounds of 16 percent superphosphate, at the outset, and substantial booster injections every third year thereafter. Water control comes high at times, but it pays off in high-income, specialized crops.

Dark, loamy soils heavy in organic content cloak the fields to a depth of 10 inches. Under them is a layer of clay. Lower still is a deposit of sand of unknown depth. In this sand Nature supplies a "tile" drainage system of her own, so extensive and so effective that in dry periods it virtually bleeds the land to death. Trying to grow crops was highly hazardous until the district and SCS technicians essayed some bold experimentation. They undertook to test the theory that the sand

could be used for two-way traffic, that it could direct moisture back to the crop when desired, and that the water table could be adjusted somewhat arbitrarily by skilled engineering.

To control the water level entailed the installation of 2 miles of main canals and 5 miles of laterals and farm ditches. Close to 40,000 cubic yards of dirt was moved—many a big bite by the draglines. The main canals averaged 5½ feet deep; 4 to 5 feet wide at the bottom; side slopes, 2:1; spoil banks lashed down by kudzu. Maximum depth of farm ditches is 30 inches, which permits machinery to cross.

The canals, equipped with gates, catch the torrential rains and dump part of the excess water into the Black River. But they do not dump all of it. They bank a portion as reserve capital, impounding it against the frequent dry spells of April, May, June, October, November, and December. The captured water, backed up through the sands and held slightly above their surface, is kept in reach of the roots of thirsty plants. The canals serve the multiple purpose of drainage, storage, and spoon-feeding.

But for downright complications, Moli nominates the Copohee farm, near Mount Pleasant. T. W. Thornhill and Osgood Hamlin, operators,



Hamlin connects irrigating pipe used for watering 13 acres of cucumbers.

work within extremely narrow limits. One-half to three-quarters inch of moisture at precisely the right time makes the difference between complete crop failure and a recent average gross of \$1,000 per acre from beans, cucumbers, and squash. The water system paid for itself in one season.

Three miles of kudzu-covered dikes protect two adjoining farms against the Atlantic's spring tides. Before these 7½-foot barriers were thrown up the land for 1,200 feet back of them could not safely be cultivated.

Included in the system are two reservoirs of a million-gallons capacity each, for irrigation. The reservoirs are tied up to the drainage lay-out to catch the surface run-off. The overflow goes down diversion ditches to the sea.

Back over the fields from the reservoirs extends an overhead sprinkler system. It is set up not more than about twice a year. Two-inch and four-inch portable pipes, hooked up to portable pumps, return to the soil just enough of the once-rejected run-off to supply the growing plants the sip or two they need, at precisely the moment they need it most.

Rounding out Copohee's facilities are combination drainage-storage canals and metal tidal gates—devices now becoming typical. Without them, the shallow-rooted truck crops would have a tough time of it.

Thornhill and Hamlin arrived at this water wizardry after extensive consideration of all the simpler methods. Moli tells me that the reservoirs got the nod after the experts had given up on wells. Shallow wells were not too salty but fell short of adequate capacity. Deep wells were known to have capacity but too much salt. At Copohee water of more than 500 parts of salt per million is regarded as undesirable for irrigation.

The Low Country does not follow a tight formula. This is perhaps the point of greatest significance. Each system is custom-built. Land types, tides, water tables, soil permeability, farmer preferences, and innumerable other factors dictate how water shall be managed.

Miracles are being accomplished on Yonges Island with gravity irrigation and portable sprinkling.

Reservoirs and shallow wells give life and vigor to the farm of C. C. Garraty, a cooperator with the Charleston County Soil Conservation District. Gate-closed depressions fingering up from the sea are also utilized to advantage here.

Genius is at work for C. E. Gibson, a district supervisor located near Meggett. On this farm a tidal basin and automatic gates hold a lake of sweet water just long enough for the highest tides to rise and recede without salt-poisoning being incurred.

There's further sleight of hand at Estherville, over on Winyah Bay, where entire fields, too low to drain, have been built up and put into production by dredging from the inland waterway.

The evidence is in. Most of the challenge of the Low Country is yet to be met. But enough already is on record to clinch the case for water conservation and management. It takes imagination, it takes farmer cooperation, it takes science—but water problems *can* be solved and an important new agricultural frontier developed.

SOUND INVESTMENT.—The Security Savings Bank in Marshalltown, Iowa, has purchased 100 yearly subscriptions to the SOIL CONSERVATION Magazine. These copies are to be sent out by the bank to cooperators with the district and to some of the rural schools in the county.



Draglines are busy in the Low Country. Here is being opened up an outlet for a new drainage system.

DISTRICT PROFILE

KENT LEAVITT Top Man



Kent Leavitt.

By ROBERT B. THORNTON

After 3 years in banking and 5 years in the Consular Service, Kent Leavitt decided that more than anything else in the world he wanted to be a farmer.

Far-away posts were all right, but the satisfaction of owning and working a piece of land, the pleasant memories of boyhood days on a farm, never failed to overshadow the often exciting but sometimes drab life of a diplomat.

And so, since 1935, Kent Leavitt has been a farmer. Fraleigh Hill farm sprawls over 400 acres in the uplands of Dutchess County, N. Y., not so far from the town of Millbrook.

Leavitt is not only building up Fraleigh Hill into an outstanding farm, but has developed a two fold farm retail business—milk and cheese.

On the side, he has taken far more than one man's share in community activities. For the past 2 years he has been president of the Boy Scouts and of the Community Chest of Dutchess County. He is chairman of the board of directors of the Dutchess County Soil Conservation District. He helped organize, and is president of, the New York Association of Soil Conservation Districts. He is a member of the New York State Soil Conservation Committee by appointment of Governor Dewey. **And just recently he was unanimously elected president of the National Association of Soil Conservation Districts.**



Kent Leavitt's fast pace keeps Fraleigh Hill on the move from 5 in the morning until midnight. He's putting a finishing touch on a field of corn that will provide prime silage this winter for his championship herd of Brown Swiss.

Kent Leavitt is not the sort of person who merely lends his name to a worthy cause. When he accepts an office it's because he believes in the job to be done, and wants it done right. He's the busiest and most energetic man I know. He never seems to tire, although he's usually up by 5 or 5:30 and rarely gets to bed until after midnight.

Leavitt is "built" for a fast pace. He's tall—a bit over 6 feet—and put together like a college end. Whatever the job, he works top speed—on the farm, in his farm office, at the soil conservation district office, anywhere. In meetings he's brusque and businesslike, but never tactless. One of his favorite stunts is to get you out of bed at 5:30 to have breakfast with him. He doesn't believe in wasting time. If he winds up some work, or comes home from a meeting or trip and half an hour remains before supper, he's more likely to wheel out a piece of farm equipment and a tractor and head for the nearest field that needs attention than he is to sit down and relax with the evening paper.

NOTE.—The author is district conservationist, Soil Conservation Service, Millbrook, N. Y.

When Leavitt first began operations at Fraleigh Hill he saw the advantage of selling direct to the consumer. A retail business for farms in his section of the country is one of his pet ideas. And so he set up a pasteurizing and bottling plant, and bought a retail milk route. Today, the milk-processing plant averages 2,500 quarts a day. Production on the home farm is a minimum of six cans, from a herd of registered Brown Swiss; the balance is purchased from other farms.

There was the problem of what to do with surplus milk during flush seasons. It gave rise to the Fraleigh Hill Farm cheese business, with Mrs. Leavitt playing the leading role.

Molly Leavitt had taken the Penn State short course, "Market Milk," which included brief instruction in cheese-making. To help on the surplus milk problem, she started experiments designed to produce a soft cheese. With the aid of J. C. Marquardt, of the New York State Division of Milk Control, and Professor Dahl of Penn State, Molly Leavitt developed a uniformly high quality cheese of the Brie type, which she called "Poona."

Today, more than 1,000 pounds of the cheese is sold each month at premium prices (about 20 to

25 percent more per pound than most similar cheeses). The business, which was started in an effort to solve a seasonal surplus milk problem, is only 2 years old.

Fraleigh Hill farm, naturally, has a complete farm conservation plan worked out in cooperation with the Dutchess County Soil Conservation District with the aid of Soil Conservation Service technicians. Highlights are contour strip cropping with rotation, drainage, clearing of land suitable for cultivation, pasture management, construction of a farm pond and diversion terraces, selective cutting of timber, fencing and reforestation.

Fraleigh Hill farm boasts two young Leavitts—Charles, now in his first year of agriculture at Cornell, and Adele, the younger. There is also a Great Dane who scares the britches off you till you find out how amiable he is. There are assorted small dogs, and horses. And there's a house that's built to "live in".

Perhaps the best way to indicate how Kent Leavitt feels about soil conservation is to quote the statement he gave to the newspapers in Chicago, just after he had been elected president of the National Association of Soil Conservation Districts to succeed the late E. C. McArthur.

"The average citizen does not realize the vital importance to each and every person of the movement which this association represents," said Mr. Leavitt. "Our land—the Nation's land—is ours during our lives but it is on this land that our children will be dependent for the food which will support a civilization for their children. We are attempting through a scientific organized service to build up the present and protect the future productivity of the country's land. We can do it by continuing the present cooperation between farmer district directors, and the Soil Conservation Service and other agencies which bring to each part of our country the scientific facts and technical advice needed to properly care for each acre of our land."

REPORT FROM A BANKER.—The actual dollar enhancement of many of the farms we have observed is just impossible to estimate," writes Robert W. Crouse, farmer and banker of Dry Run, Pa. "At one time our Committee declined a \$3,000 mortgage on one of the farms on which you have done extensive work within the past two years because of the limited potentialities due to serious erosion problems. We feel those practices now being employed have definitely curtailed and improved the situation to such an extent that a \$4,000 mortgage would be readily approved."



Under Leavitt's admiring eyes, his wife Molly tests samples from a thousand-pound vat of certified milk that will soon become a new batch of "Poona" cheese. "Mrs. Leavitt and I are a team," says Leavitt.



2. Farms Remade *Between Dawn and Dusk*

IN 12 HOURS last fall, two badly worn hill farms covering 208 acres in Licking County, Ohio, were completely made over on modern, soil-conserving lines. Normally, that job would have taken around 4 years for the owners to accomplish by themselves. Volunteers—600 of them—helped do the job as a dramatic demonstration of the new soil-conservation techniques. An amazed throng of 50,000, gathered on the slopes of a huge natural amphitheater, saw them do it. Everybody, pretty much, agreed that the two farms were worth \$10,000 more at 6 p. m. that day than at 6 a. m.

It was on September 21, 1946, that the first 1-day demonstration of this sort was held on the Clyde Milner farm near Pleasantville, Iowa. Since then, approximately 20 such transformations have been effected in Iowa and surrounding Corn Belt States during 1947. But the Ohio show was the most spectacular.

The title for the demonstration, "Opening of the Second Frontier," came from the fact that the only new geographical frontiers left in the United

States lie in the better use of the land left available. The historical motif was further emphasized by the fact that this part of Ohio is rich in historical background.

The site of this big agricultural "bee" was the 128-acre farm of John Rodman, 10 miles east of Brownsville, Ohio, and the adjoining 88-acre farm of George Latham. Both young men are veterans. Their properties needed 15 major measures for protection against erosion and for full efficiency. It took a lot of preparation, planning, and action.

The technicians from the Soil Conservation Service helped all the way, from the earliest planning stage until the last act. Everything was under the sponsorship of the Licking County Soil Conservation District. Technical planning was done by Pearl Fogle, of the United States Soil Conservation Service, and members of the local district work unit staff. The district supervisors, headed by J. F. Morrison, chairman, took the lead in planning over-all details. Louis Bromfield, Ohio's noted novelist, known as "The Sage of Malabar

Farm," served as chairman of the general advisory committee.

Central Ohio has never witnessed a cooperative event which has drawn greater public support than "Opening of the Second Frontier." Strong support and financial help came from farm magazines and newspapers of the Buckeye state, chambers of commerce, civic and farm organizations, the Ohio Division of Conservation and Natural Resources, and from private industry. Heavy power equipment and farm implements to stage the demonstration came from 38 different implement dealers. Limestone companies donated eight carloads of lime, and an equivalent amount of fertilizer was contributed by the fertilizer companies. Several hundred farmers and businessmen of central Ohio gave a day's work to make the project a rousing success. Four hundred ex-soldiers were there. Bands played and local church organizations sold fried chicken and other edibles.



Entry in pioneer pageant.

No soil conservation event has ever received greater recognition from the press and radio. Five major radio stations carried the program, national magazines and farm journals were present, and the wire services gave it national coverage. The "Opening of the Second Frontier" was even carried by the major news reels and shown in theaters throughout the United States. Bill Diehl, staff man for the Newark Advocate, was chairman of the publicity committee.

Fences were torn down and restrung on the contour. Fields were plowed on the contour. Gullies were filled, fields fertilized, pastures limed and fertilized, cover crops seeded, strip crops

seeded on the slopes, wet spots tile-drained. A new barn was built. A farm pond was scooped out and quickly started filling from a spring. Wildlife areas were provided. A woodlot was cleaned up, additional trees set out. A great variety of measures, typical of the techniques being applied all over the Nation, to meet the needs and capabilities of our highly varied conditions of land, climate, and type of farming were included, in accordance with the detailed farm plan that had been prepared in advance. The onlookers readily understood exactly what was being done by way of putting every acre, every field, every square foot of land to its proper use in order to protect it from erosion permanently, and to assure increased and continued production according to the capability of the land.

The whole job required 74 tractors, 5 post-hole diggers, 2 tractor-power mowers, 27 plows, 6 disk harrows, 8 grain drills, 54 lime spreaders, 3 buck rakes, 4 field cultivators, 2 disk terracers, 3 cultipackers, 2 hydraulic loaders, 2 dirt scoops, and a lot of small tools.

The project ripened not only from skilled technical direction and district cooperation, but also from the teamwork of the neighbors involved. Rodman and Latham deeded each other portions of their farms to preserve the natural contour lines; an old up-and-downhill boundary fence was ripped up and reset for greater convenience and more perfect conservation. The boundary was fixed at the 1,003-foot contour level—a unique and appropriate provision for avoiding any possible confusion in the future.



State Conservationist Kennard, Louis Bromfield, Hugh Bennett.

Chief Bennett, impressed by the exchange of deeds by landowners, commented in his address: "If we could settle international boundary disputes in the same amicable manner, many of the ills now facing the world would be cured. Moreover, it's going to be difficult to argue about the proper location of the farm boundary, since it is based on a very fixed position—precisely 1,003 feet above mean tide level of the Atlantic Ocean."

The speaker brought the tremendous acreage loss into understandable terms when he remarked that, in all of Ohio, there are just 26,000,000 acres. "The carrying out of 15 major conservation measures here today means the stabilization of these farms for agricultural production," he said. "And because the farms have gained a permanency they didn't have before, their value has been increased decidedly between this morning and this afternoon."

For Hugh H. Bennett the day brought an unexpected recognition which seldom comes to a national leader during his lifetime. In his long career as a public servant Bennett is credited with having done more than any other man to advance the cause of soil conservation. Members of the Ohio Association of Soil Conservation Districts, some time before the field day, had decided quietly among themselves that recognition should be given to the Chief for his outstanding contribution to the Nation's future welfare.

There had been neither advance publicity nor advance notice to the recipient when Clay Stackhouse, as head of the Ohio Association of Soil Conservation Districts presented him with a scroll during the field day ceremonies which reads: "In grateful appreciation of Hugh Hammond Bennett, father of soil conservation, chief of the U. S. Soil Conservation Service—this tablet is placed by the Soil Conservation Districts of Ohio on Second Frontier Day, October 2, 1947." The same inscription has been placed on a bronze tablet which will be permanently mounted on a granite marker along the site of the Second Frontier Field Day.

Commenting editorially upon this unusual recognition, the *Ohio State Journal* in its issue of October 2 said in part: "It is not often that anyone lives to see his works commemorated in a bronze tablet, but there are rare occasions when a man's contemporaries recognize his devotion to a high purpose, his contribution to the welfare of his country and his fellows and his downright hard

work, by erecting a plaque or a monument both in his honor and in his presence.

"Everywhere the chief of the Soil Conservation Service has spread the gospel that 'conservation pays' until today there is scarcely anyone in the Nation who does not believe in it to the utmost. His is an achievement which well merits not only a plaque but a place alongside the foremost of the Nation's scientists, inventors, and statesmen, for he can qualify under any and all of those classifications."

AUDUBON HONORS TO BENNETT.—The National Audubon Society, meeting in New York on October 21, awarded a bronze medal to Hugh Hammond Bennett, Chief of the Soil Conservation Service, together with scroll and citation. The citation reads:

"HUGH HAMMOND BENNETT, greatest soil evangelist of all time, true conservationist, whose teaching is now basic in sound agriculture throughout the world, whose achievements supply a chapter in modern school text books of American social history. Consulted by presidents and ministers of state, he never lost the common touch. Philosopher as well as scientist, he had the courage to denounce Americans as a nation of destroyers, careless, greedy, in a hurry, terribly inefficient. Disappearing woodlots were leaving barren hillsides, scarred with erosion gullies. Overgrazing and overplowing were turning mountain pastures and lush prairies into deserts, which blew away in wind storms. With boundless good will, he has shown us how to restore our damaged land, how to prevent further destruction. He gave us hope, a new gospel, and proved that the priceless gift of great natural resources can be both enjoyed and maintained from generation to generation."



TECHNICAL ADVICE REQUIRED.—"Soil conservation has enabled us to stop erosion, grow better crops with less labor, and improve our soils," writes F. W. Atkinson, Augusta, Ga. "Most farmers have the ambition to take care of their soil, and grow crops that are suited to their lands, but without some advice from practical leaders they do not know how to accomplish their aims."



The clock reminds us that time is short for saving the soil.

By WALLACE D. MALONE

Address Before the Alabama Association of Soil Conservation District Supervisors

A Banker Appraises Our Duty to Soil

NEARLY 2,000 YEARS AGO one of the prophets wrote, "Many shepherds have destroyed my vineyard, they have made my pleasant lot a desolate waste. They have made it a desolation. In its desolation it mourns to me. The whole land is made desolate because no man layeth it to heart."

Gentlemen, not so many times in the history of this world has there been born an unselfish idea, with practical and universal application. But when such an idea has been originated in an unselfish mind and heart, it has usually attracted to itself other kindred souls, and has imbued them with a missionary spirit. Many times the birth of such an idea has marked a turning point in the progress of the human race. Sometimes it takes one or more centuries to develop into its full flower, and there is sometimes often a long retrospect before its true value can be assessed.

Let us recall a few instances from history. One such idea was the formation and the publication of the Ten Commandments. I will give you the eleventh later! Another, was the recognition of

the universal brotherhood of man. I am my brother's keeper. Another was the recognition and definition of the *natural* rights of every human being (rights which must not be taken away from him, even by the overwhelming majority). The right of free speech, free thought and religious freedom. The trial by a jury of one's peers. Then comes the democratic idea, government based on the will of the people. Government of, by, and for the people.

All of these, together with others which I will not enumerate, have been the stepping stones upon which the human race has traveled away from savagery.

Then, of course, that greatest of them all! The idealist who was born 1,947 years ago—His divine golden rule, everlasting future life, the fatherhood of God. The idea of repentance and forgiveness, and all other Christian attributes. The blessed idea which will some day be universally adopted throughout the world. Then, and not until then, will we have everlasting peace.

And now—perhaps late, but thank God not too late—has come to us the idea of soil conservation on a national scale. Conservation in the interest, not only of ourselves and our fellow men, but even more largely in the interest of future generations. And this idea, like others, has appealed to the missionary spirit of many men.

A few years ago I had charge of the program at the annual convention of the Alabama Bankers Association, and Dr. Bennett addressed the convention. In this address he referred to the fact that he was "born in a North Carolina gully." I said then and I repeat now that this gully should be moved to Washington and framed for all to see. At least it should be made a national shrine.

You see, gentlemen, saving the soil, together with all the byproducts therefrom—the green forests, the little spring in the woodland, the tiny plants, the fish in the streams, the animals and the birds, the very living waters under the ground—saving the soil is absolutely fundamental to the progress, yes, the very existence of the human race. Our work here is basic. The other flowers of civilization will fade if we lose the soil.

For instance, to education we may say. "Your *existence* depends on the soil. Make your analysis of the best methods of training youth to meet life and to be victorious over it. Build your buildings, equip your laboratories, teach our children the *true* history of this world, its languages and customs, and its science. We will make it possible to do these things, *for we will save the soil* so that your voice need not echo in any empty classroom."

To science: "Learn the secrets of all matter and the laws of its behavior. Harness power and matter for the good of man. Have your disputes and arguments over your theories and findings, in an effort to isolate the truth. Make thus a better world. But while you are doing this we will assure the necessities and comforts of life, *for we will save the soil.*"

To industry: "Invent and design and operate machines to use the raw materials from the soil, to manufacture those things which have given comfort to man, and have freed him from back-breaking toil and have given him leisure time to enjoy the better things of life. But do not let the machine dominate us. You may do these things because *we will save the soil* and furnish you the materials which go into your end product."

To the sportsman: "Enjoy your well-earned recreation and live a longer and better life therefor. When you pitch your lure in a dark cool spot beneath the overhanging bough remember the stream is clear and fish can live therein only because the soil has been preserved."

To the practical politician who makes government what it really is we say, "We must here

HE SAW A "FINANCIAL GULLY."—Wallace D. Malone is president of the First National Bank of Dothan, Ala., and is a member of the State legislature representing Houston County. (See SOIL CONSERVATION Magazine for September 1947.) He is also, and we might say first and foremost, a soil conservationist. Malone tells how he first became interested in soil conservation, as follows:

"One day a young man came into the bank with a brief case and some other papers. I thought to myself, 'Here comes either a calendar salesman or an income tax man.' He said his name was A. A. Sheppard and he asked for 5 or 10 minutes of my time to talk about soil conservation. I confess it was a subject I knew little about; except that improperly constructed terraces would break.

"Sheppard came to me with a zeal and spirit I have seldom seen. He gave me a shock when he made the statement that practically every farm in this county had lost a good part of the topsoil. I disputed this statement and picked out one of the finest level farms in this section to disprove his argument. After he had proved to my satisfaction that this farm itself had lost around 25 percent of its topsoil and that a lot of land was being cultivated that had lost as much as 50 percent, I began to wake up.

"What really shocked me was his statement that soil building crops *will not* completely restore soil to its natural condition and volume. You see the finality there. I then realized that we must make vigorous efforts to save the soil that we have left ahead of everything else.

"I remember some of the early settlers came into this county because, they said, their soil 'wore out' over in Georgia. I began to realize that the soil did not wear out, but they permitted it to wash into the Chattahoochee River. I then realized that soil erosion would wash a financial gully right under my bank if we permitted it to continue in this area.

"I took an airplane trip over this county and saw the jagged gullies, whose snake-like figures ran out in every direction. I also saw the sheet erosion from the air. I flew over my own farm and was painfully surprised to see that I did not know how badly my own farm was eroded. Then, as a final upset, Sheppard showed me how erosion was not only destroying the soil on the hillside, but that it also, when it got to a certain degree, destroyed the soil in the valley by putting the clay on top."

A. A. Sheppard, referred to here, is district conservationist of the Soil Conservation Service at Tuskegee, Ala. At the time of his first talk with Banker Malone he was superintendent of a CCC camp assigned to the Soil Conservation Service near Dothan.

make democracy work. We must not continue to abuse it through selfish interest, political or otherwise. If we do, it will fail and its place will be taken over by strange theories which know not God. And right here let me say, let no man lay political hands upon this vigorous and zealous and noble endeavor, gentlemen, it is operating as smoothly as a watch. By all means let us leave it alone—this organization of missionaries who spread a vital message of hope through the land and by their enthusiasm are stopping the ravages of erosion. You make democracy work and meanwhile we will preserve that which it must have to survive—the soil.”

What shall we say to the makers of war? “Though war destroy the cities, take the lives and health and security of millions, even though it cut down the young pear trees and apple trees and vines, God will wipe away all tears, and *if the soil be not lost too*, another and brighter and fairer civilization will grow on that spot. The cities will be rebuilt and the fields will be replanted—for we will save the soil.”

The soil gives strength. Any nation that either got very far away from the soil or permitted its soil to leave, did not survive. The soil gives strength to the individual. I remember in 1932 when I was in the banking business—and many a time then I wished I was back in France fighting the Germans—I remember when worry put my nerves on edge. When I couldn’t soundly sleep. I remember my doctor told me to play golf, to have a hobby, to go to the picture show, or to play chess, to distract my mind. I tried these with fair results.

But when I really wanted peace of mind and a renewal of my strength and courage, nothing brought this like lying flat on the good earth, getting as close to it as I could. At such times I recall the giant, Antaeus, whom Hercules had to fight. Every time Hercules would throw him to the ground, Antaeus’ strength would be revived 10 times. Hercules won only by keeping him in the air and keeping him away from the earth until his strength was gone.

If we lose the soil we lose all, so let us take this for our creed, and I quote the eleventh commandment. “Thou shalt inherit the holy earth as a faithful steward, conserving its resources and productivity from generation to generation. Thou shalt safeguard thy fields from soil erosion, thy living waters from drying up, thy forests from desolation, and protect thy hills from overgrazing by thy herds, that thy descendants may have abundance forever. If any shall fail in this stewardship of the land, thy fruitful fields shall become sterile, stony ground and wasting gullies, and thy descendants shall decrease and live in poverty or perish from off the face of the earth.”

So let us go about our work conscious that when there shall have been allotted to each of us, the 21 square feet of this earth’s surface, we shall have deserved it, if during life we have saved from destruction that many square feet, or more, for the future benefit of the human race.

The good earth—nature spent *millions* of years to make it. Let us not lose it in a moment! Therefore, let us lay it to our hearts.

GUIDES SPEED CONSERVATION IN NORTHEAST

By O. C. BRUCE

WHEN INCREASED DEMAND for technical services stepped up our work load by leaps and bounds, as organization of districts swung into high gear, it became clear that we needed a ready-reference guide for both new and experienced technicians if the high standards of the Soil Conservation Service were to be maintained.

We needed a document, prepared locally, that

would be of material help to technicians in making sound recommendations for land use and conservation treatment. It was needed for experienced employees who were transferred from one work group to another as districts developed rapidly. It was needed for in-Service training for new employees. Most important, the document had to be developed by field workers themselves, so they would understand it and use it to speed the production of farm plans.

Accordingly, a general outline was devised by a regional field committee which spent months of

NOTE.—The author is regional chief of operations, Soil Conservation Service, Upper Darby, Pa.

SOIL GROUP 3				LUC TABLE						
SOILS	DESCRIPTION	Slope		Erosion						
		A	B	1	2	27	3	37	38	
				I	II	III	IV	V	VI	VII
6-5 Enfield fine sandy loam	Wind deposited material of fine mellow texture sandy loam as a mantle of two to four feet deep over gravelly till or sandy outwash. The surface textures of these soils are either fine sandy loam or very fine sandy loam. Subject to wind erosion & severe sheet & gully water erosion when occurring on rolling slopes. There are no stones or gravel present under natural conditions. The productivity of a wide variety of crops grown on these soils is well above average. Shallow rooted grasses & pasture are less productive when established on these soils.	B	II	III	III	III	IV	IV	IV	VII
6-5V Enfield very fine sandy loam		C	III	III	III	III	IV	IV	IV	VII
635 Enfield fine sandy loam (shallow phase)		D	IV	IV	IV	IV	VI	VI	VI	VII
		E	VII	VII	VII	VII	VII	VII	VII	VII
		F	VII	VII	VII	VII	VII	VII	VII	VII
CONSERVATION PRACTICES AND TREATMENT ACCORDING TO CAPABILITY CLASS AND LAND USE										
LUC CLASS	LAND USE	SEED ,TREE ,AND SHRUB , MIXTURES (37)	TREATMENT			SUPPORTING PRACTICES				
			Fertilizer	Manure	Lime to pH					
I	5 years continuous row crops w/cover - 2 years soil bldg. legumes & grasses or green manure	Rye 1.5 to 2.5 bu. per acre or Winter Wheat 1.5 to 2.5 bu. per acre or Ryegrass 20# per acre Sweet Clover 15-25# per acre Soil Building:- 6# Red Clover, 1# Ladino Clover, 6# Timothy, 1# Red Top OR Green Manure:- Soybeans 6-8 pks. OR Millet 25#, Soybeans 4 pks.	400# 7-7-7 on cover	or	15 T	5.2	Windbreaks (5), Cover crops (1), Crop Residue Mgt., Obstruction Removal, Irrigation (40), Mulch, Headland Seeding, Contour planting (2), Spot Drainage (40), Sod Waterways (3)			
	Peach Orchards	Rye 1.5 to 2.5 bu. per acre Winter Wheat 1.5 to 2.5 bu. per acre Ryegrass 1.5 to 2.5 bu. per acre Sweet Clover 15-25# per acre	400# 7-7-7 on cover	or	15 T	5.5	Good fertilization, Spot drainage (40), Water supply development, Cover Crops (35), Mulch, Contour Planting (40), Headland Seeding (34)			
II	"A" Slope 4 years row crops w/cover 2 year green manure OR Soil Bldg. grasses & legumes	Rye 1.5 to 2.5 bu. per acre Winter Wheat 1.5 to 2.5 bu. per acre Ryegrass 20# per acre Sweet Clover 15-25# per acre Green Manure:- Soybeans 6-8 pks. OR Millet 25# & Soybeans 4 pks. Soil Building:- 6# Red Clover, 1# Ladino Clover, 6# Timothy, 1# Red Top	400# 7-7-7 on cover	or	15 T	5.2	Strip Crop (4), Diversions (40) & Outlets (17), Green manure, Mulch			
	"B" Slope 4 years row crops w/cover 2 years green manure OR Soil bldg. grasses & legumes	Rye 1.5 to 2.5 bu. per acre or Winter Wheat 1.5 to 2.5 bu. per acre or Ryegrass 20# per acre Grass Seed Mixture:- 4# Alfalfa, 6# Timothy or 8# Orchard Grass, 1# Red Top, 4# Red Clover	Inoculation 500# 4-12-4 500# superphosphate 200# muriate of potash	or	12 T		Terraces & Outlets (40), Green Manure, Cover Crops (1), Diversions (40) & Outlets (17), Clearing & Obstruction Removal, Crop Residue Management, Headland Seeding, Green Manure			
	"B" Slope 2 years row crop w/cover 2 years hay	Rye 1.5 to 2.5 bu. per acre or Winter Wheat 1.5 to 2.5 bu. per acre or Ryegrass 20# per acre	400# 7-7-7 on cover	or	15 T	5.2	Contour Strip Cropping (4), Cover Crops (1), Diversions (40) & Outlets (17), Mulch, Crop Residue Management, Clearing & Obstruction Removal, Headland Seeding, Spot drainage (40), Sod Waterways (3)			
	Peach Orchards	Rye 1.5 to 2.5 bu. per acre or Barley 1.5 to 2.5 bu. per acre or Ryegrass 20# per acre Sweet Clover 15-25# per acre	400# 7-7-7 on cover	or	15 T	5.5	Orchard Terraces (40), Layout on Terrace grades (40), Alternate sod strips, Cover crops (35), Water supply development (34)			
III	2 years Row Crop w/cover 4 years hay	Rye 1.5 to 2.5 bu. per acre Winter Wheat 1.5 to 2.5 bu. per acre Ryegrass 1.5 to 2.5 bu. per acre Sweet Clover 15-25# per acre Grass Seed Mixture:- 10# Alfalfa, 6# Timothy or 8# Orchard or 8# Field Brome; 2# Red Top OR 4# Alfalfa, 6# Timothy or 8# Orchard Grass; 4# Red Clover, 1# Red Top	400# 7-7-7 on cover	or	15 T	5.2	Narrow contour strip cropping Diversions (40) & Outlets (17) Mulch Cover Crops (1)			
	Apple Orchard Pear Orchard	Grass Seed Mixture:- 4# Alfalfa, 6# Timothy, 4# Red Clover, 1# Red Top	Initial Treatment:- 500# superphosphate 200# muriate of potash Annual Top Dress:- 200# superphosphate 200# muriate of potash	or	15 T	5.8				
			Initial Treatment:- 500# superphosphate 200# muriate of potash 20# Borax on alfalfa Annual Top Dress:- 200# superphosphate 150# muriate of potash	or	15 T	5.5	Permanent Sod Cover, Water Supply Development, Mulch, Contour Planting (40), Spot drainage (34)			
IV	Long Term Hay	Grass Seed Mixture:- 10# Alfalfa, 6# Timothy or 8# Field Brome; 1# Red Top OR 5# Alfalfa, 4# Red Clover, 6# Timothy, 1# Red Top	Initial Treatment:- 500# superphosphate 200# muriate of potash 20# Borax on alfalfa Annual Top Dress:- 200# superphosphate 150# muriate of potash	or	15 T	6.3	Control grazing, Rotation grazing (38), Mow during early bloom stage (36), Re-seed in strips, Stock Water Development (7)			
	Hedge Rows (6)	Multiflora Rose (19) Amur Privet	4 oz. 5-8-7 per seedling			5.0	Site Preparation, Pruning, Release Cutting, Wildlife management			
	windbreaks (5)	Trees:- White Pine, White Cedar, Norway Spruce, Scotch Pine Shrubs:- Low - Bayberry (14), Filbert-Hazelnut (18), Multiflora Rose (19) High - Silky Cornel (23), Tatarian Honeysuckle (24)	4 oz. 5-8-7 per shrub seedling			5.0	Site Preparation, Pruning, Release Cutting, Wildlife Management			

study and careful planning. To date, about 75 technical guides, covering approximately half the land in the northeastern States, have been completed. More are in preparation. Ultimately, there will be a technical guide for each work group in the 12 States. Where a work group has two or more work units with widely different conditions of soil and agriculture, a guide may be prepared for each such unit.

Each technical guide is developed in the field with the assistance of zone conservationists, technical division chiefs, county agents, farmers, members of district governing bodies, extension specialists, experiment station workers, and others. The job is done in "off seasons" or so-called office

days when field work can't be carried on. The result is a simplified agricultural workbook for the area. The soils are grouped according to the physical features which affect moisture conditions, crop adaptations, natural fertility, and the type of practices favored. One page is devoted to each soil group. This contains a description of the soil group and a table showing cropping systems and conservation practices considered appropriate for each capability class.

In addition to the grouping of soils (many guides have 20 or more) and the conservation recommendations, there are sections which explain the meanings of various soil characteristics, slope categories, and land-use classes. Offhand, this

might appear to be a bulky, cumbersome document. Actually, because of the excellent work of the committee, the technical guides are simple, concise, and easy to follow.

The outline prepared by the technical guide committee calls for nine parts, the last section being the appendix where reference material, bulletins, tables, and other items may be included. Part VII is the "keystone" of the guide. It is the set of charts, organized by soil groups, wherein the physical conditions are correlated with land use and the needed conservation practices recommended. A study of the accompanying chart, which is reproduced in part, will reveal the detailed information included in the "keystone" section of each technical guide.

With the conservation survey map before him, all a farm planner has to do to plan a field is to note the type of soil and determine its soil group, the slope, and the degree of erosion. By referring to the land use capability table, included on the soil-group sheet, he can tell at a glance the land use capability class in which it falls.

He can then glance down the left margin of the page and find the corresponding land use capability class. If he is dealing with class II land, he will find a number of recommended uses for this group of soils which are in class II. He then selects the recommendation which he believes will best meet the farmer's needs; and then, on the same line of the chart, he will find recommended seeding. Next to that will come instructions for fertilizer, lime, and manure. In the right margin, he will find recommendations for supporting conservation practices. Complete instructions are provided for all classes of land, from safe cropland requiring no conservation practices to class VII land which should be planted to trees or shrubs.

So much for preparation and use of the technical guide. We are now taking the second step: Coordination among neighboring districts which have similar soil types and conservation problems. In this activity, the zone conservationists are taking the leadership.

As an example, Zone Conservationists Charles H. Lloyd and Gail W. Eley last winter held conference with numerous district conservationists to gain a uniform approach to common problems. Technicians have benefited by the shared experiences of all those present, and technical guides were improved.

Efforts of zone conservationists have not stopped

at State boundaries. In one instance, meetings were held with technicians of the York and Lancaster County Soil Conservation Districts of Pennsylvania, and those from the Baltimore and Harford County districts of Maryland. Extension agronomists of the University of Maryland met with them. In this instance, major emphasis was placed on Piedmont soils, which are found in all four work groups. Uniformity, of course, isn't sufficient justification in itself, but a meeting of minds among persons with a wide variety of experiences with particular types and conditions of soil just naturally results in an improved approach to the management of such soils.

This pioneer work in correlating technical guides isn't limited to interstate collaboration but opens up possibilities for interregional cooperation. Certainly, States which have a common border, but are in adjoining regions, have mutual problems whose solution can be speeded up through interregional conferences.

It's too soon to estimate just how much the use of technical guides has helped the Northeastern Region to double its annual production, but it's certain that by cutting planting time to a minimum, their contribution has been considerable.

TERRACES STOP EROSION.—"My crop yield this last year was slightly better than 10 percent over the preceding year," writes S. D. Ellison, Winnsboro, S. C.

"This farm contains approximately 1,200 acres of land—approximately 650 acres under cultivation, 400 acres in woodland, and 150 acres of cleared land not in cultivation. Under the supervision of the county conservationist, I have constructed more than 85,000 linear feet of terraces, thereby completely stopping erosion on a large acreage of the cultivated land. The good these terraces have done shows not only in improved crops, but in the better appearance of the land, thereby enhancing the value of the farm. With the continued help of the Soil Conservation Service I plan now to terrace every acre on the farm and will be able to cultivate this coming year about 30 acres that have been practically thrown out.

"Following the advice of the Soil Conservation Service I have seeded about 150 acres of land in sericea lespedeza and put out 10 acre of kudzu and am allowing about 25 acres to grow up in loblolly pine. The stand of pine is exceptionally good as it is constantly being reseeded from seed trees on three sides of this field.

"The good derived from strip-farming on a 25-acre field speaks for itself—I did not have a break in any terrace on this field.

"Lespedeza was seeded in all fields where grain was planted and I will repeat this practice this year with the exception of a 35-acre field that I expect to follow with giant striata crotolaria."



MANY HANDS BUILD

Granite Creek DIVERSION DAM

By CHARLES F. RORK

ONE OF THE BEST EXAMPLES of cooperation by Federal and local agencies in attacking a soil-and-water-conservation problem is the Granite Creek diversion dam in central Arizona.

A few miles north of Prescott lies the 5,776-acre Chino Valley Soil Conservation District. As in all western States, the conservation and wise use of water on irrigated lands is a major problem. District operations in Arizona are by law confined to farm lands and are not authorized on range and forest areas.

Shortly after the district was set up and the board of supervisors was organized, late in 1945, Chairman Carl Clark and Supervisors De Vere Pace and Jenner Hatch met with John D. Freeman, district conservationist, to begin work on the district program and work plan, and to size up their conservation problems.

The district's main farming enterprise is the Chino Valley Irrigation Co. This organization supplies life-giving irrigation water to 55 farming units comprising about 2,600 acres, and the stockholders depend upon the water supply of Granite Creek to mature their crops.

When the district was formed, many of the irrigated farms usually suffered from an acute water shortage in midseason, when crops need water most. The total streamflow from melting snow in the watershed was sufficient for the acreage under cultivation. However, much of this snow melts early in the spring and tends to run off before irri-

gation water needs are greatest. Because of this unbalanced water supply, farmers often applied too much water in the spring. The result was to impair soil structure and cause soil depletion by leaching of plant foods.

The water of Granite Creek was being diverted into the canal system by means of an old patched-up dam of wood, rock and wire, with a concrete base resting on the gravel stream bottom. Twenty-five feet of gravel separated the dam from bedrock and underflow was responsible for most of the loss of 1,500 gallons of water per minute throughout the irrigation season. Annual maintenance costs for the last 20 years had been exceptionally high.

Improvements in irrigation practices were needed on all farms in the district. Many of the farm irrigation systems needed major changes such as land leveling, reorganization of fields, improved canal structures, and canal lining. These measures would conserve water and labor, increase production, and prevent soil decline.

"Before we can make any of these changes, though, we must find a way to strike a better balance between water supply and crop needs," Chairman Carl Clark said to his associates. "The first job we ought to undertake is to build a better diversion dam in Granite Creek so we won't waste so much of our valuable water."

Clark also was a member of the water board of the Chino Valley Irrigation Co. Year after year, he had helped with the futile maintenance on the old dam and had noticed the precious water going to waste at this point.

The water board members agreed with the soil conservation district supervisors that the problem

NOTE.—The author is zone conservationist, Soil Conservation Service, Phoenix, Ariz.

should be studied and action planned. They realized that the value of the water lost and the cost of maintaining the old structure throughout the years would have paid for an efficient and substantial dam many times over.

On October 15, 1945, the district supervisors requested the Soil Conservation Service to investigate the proposal for a new dam. They wanted to know what would be the best type, how much it would cost, and how long it would take to build.

Freeman called in W. G. Glover, the work group engineer. They decided to study the proposal immediately, and invoked the assistance of the zone conservationists and regional engineering staff.

Glover made a detailed engineering survey of the proposed site. He drew up an accurate topographic map, and made 200 foundation soundings to determine depth and shape of bedrock. Plans,

specifications, and cost estimates were prepared. These indicated that a concrete gravity-type dam was most adaptable. It should be 120 feet long with a maximum height of 25 feet above bedrock. The crest width should be 30 inches and the base width 16 feet. This would take 590 cubic yards of concrete and cost approximately \$11,000. Three contraction joints with copper seals would be required to prevent cracking.

The plans, specifications, cost estimates, and contract conditions were turned over to the water board 1 month after the request was received. The board decided to ask bids from contractors.

The bids were based on unit costs and the lowest was about \$20,000. This was approximately \$8,000 more than the irrigation company could afford.

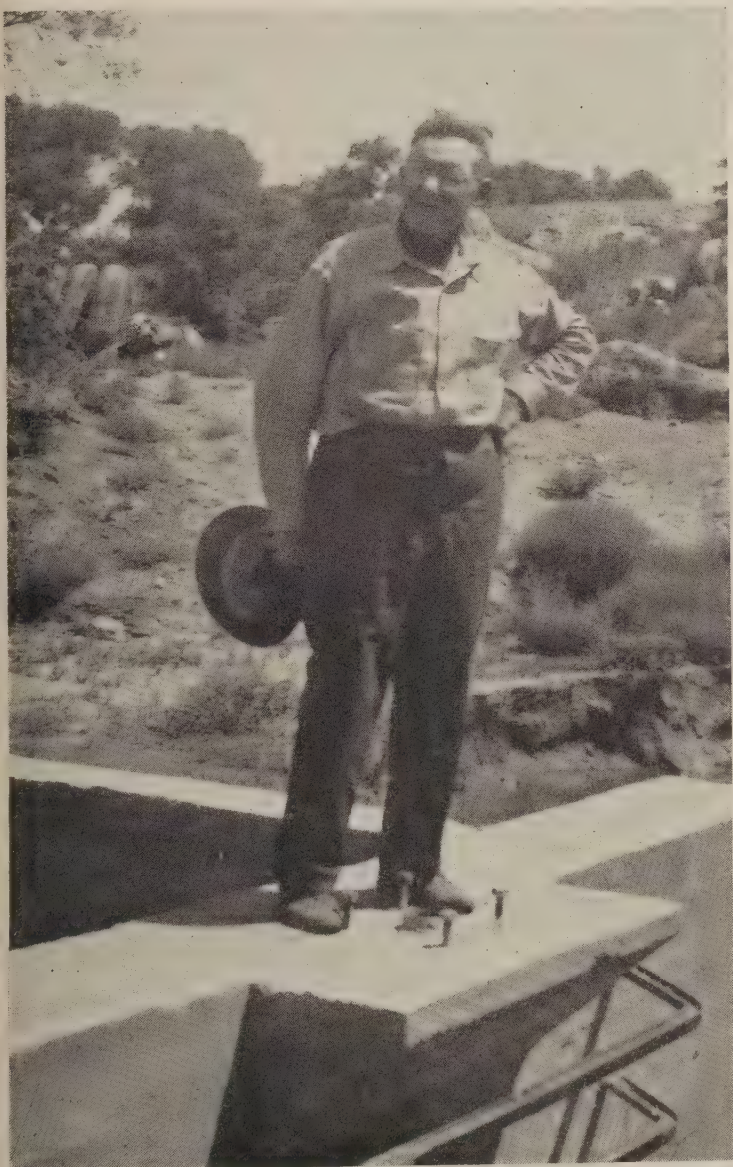
Most of the water board was about ready to abandon the project. They felt that they couldn't finance such a big job. But Clark believed that the dam could be built for close to \$11,000, as the Soil Conservation Service technicians had figured. He checked again with the engineers and asked what personnel and equipment would be needed to build the dam within the original estimate.

He was told that he would need an experienced and dependable superintendent and foreman, a $\frac{3}{8}$ -cubic-yard dragline, a 40-horsepower tractor equipped with bulldozer, four pumps, a concrete mixer, trucks, and a crew of at least 12 laborers, in addition to the necessary materials. He found that the local agricultural conservation committee, under a pooling agreement, would commit a \$5,000 payment if the dam were built according to Soil Conservation Service specifications.

Clark immediately contacted the water board members, and, with this information, they decided to start construction right away. The board made Clark superintendent of the job and gave him full authority to act and deal on behalf of the company. He found a well-known concrete man, Carl Davis, to serve as foreman. Farmers holding stock in the company agreed to devote their own labor when asked to do so.

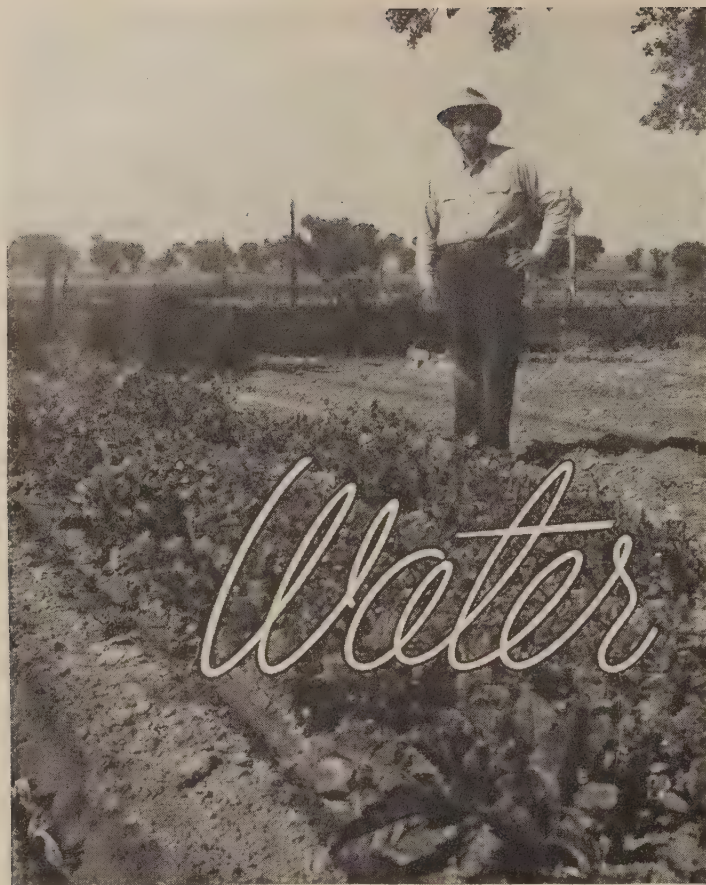
The soil conservation district supervisors promised to rent the company a dragline of the proper size. This had been loaned to the district by the Soil Conservation Service for work of this sort. The district charged a rental sufficient to cover normal operation, maintenance, and replacement costs.

(Continued on page 144)



Carl Clark, chairman of the board of supervisors of the Chino Valley Soil Conservation District and member of the Chino Valley water board.

Al Foutz in the garden that produced the first early peas in the San Juan Valley last spring.



Water Problems in the Southwest

By ELIZABETH J. POE

WHAT CAN A FARMER do when his land is waterlogged? Dig a drain? Blast a drain? Find out where the water is coming from and try to stop it? There are many answers to this problem, which occurs in certain areas of the Southwest more often than most people realize.

Railroad dikes, undiscovered clay substrata, bad irrigation methods—all these unrelated causes have been found by the Soil Conservation Service to be at the bottom of various waterlogging problems in New Mexico, Utah, and Colorado. In one instance investigated by a soils scientist, nobody in the neighborhood of the swamped field could remember when it had last produced a crop. In another, a farmer had spent a considerable sum building three ditches to drain an unproductive field and had got nothing for it. He was reluctant to pour money down the drain. Like many other landowners in the Southwest region who have worked with soil conservation districts on drainage problems, he found that his drains wouldn't work until he knew what was under his field—six feet down.

This landowner was Al Foutz, who has become one of the leading advocates in the San Juan Basin

of northwestern New Mexico of progressive measures that control seep and maintain productivity.

About 3 years ago Foutz sought out A. P. Blake, chairman of the San Juan Soil Conservation District board of supervisors. For many years Foutz had been troubled with waterlogging, and the dis-



Here is where water gushed out at head of drain.

NOTE.—The author is information specialist, Soil Conservation Service, Albuquerque, N. Mex.



Sheep grazing on once seeped and useless alfalfa pasture. The land beyond them, also waterlogged before drainage, is plowed and ready for a crop.

strict supervisor suggested that a Soil Conservation Service farm planner come out to the Foutz ranch and look the situation over. But Foutz himself tells the story from this point, which starts after the farm planner had come to see him.

"When we got through tramping around the farm talking about the different points of development you could just see a blueprint of the future of my place, and it looked pretty good. That young fellow said he'd have a soils man and an engineer from the Soil Conservation Service up the next Tuesday morning to make a survey for the drain. Sure enough, bright and early that morning I saw them out there setting stakes and drilling holes all over that seep land and out in the cropland, too. They set stakes every 100 feet. Then, with an inch auger bit they drilled holes 6 feet deep at each one of those stakes, testing the soil every foot of the way down. When they got through I had as good a picture of the different types of soil under the surface as I had of that on top.

"They said I had a clay dike holding up the water that would ordinarily move along under the ground without causing any harm. This ponded underground water caused an accumulation of alkali salts at the surface as well as waterlogging the land and it would just keep spreading, which certainly was the case, since the school had reported it was starting to come up in the basement, over a half mile away.

"They figured it would cost me about \$200 to dig a drain to take care of the situation. I didn't like the idea as I had already dug three drains just like the one they wanted, but I could see from that underground picture they had made why my drains never worked.

"Well, I finally gave them the go-ahead and the soil conservation district dragline moved in. I felt pretty good until the day my \$200 budgeted for the job ran out. I'd spent the required amount on this drain and the water wasn't running in it

any more than it was in the others. That young soils man wouldn't listen, though. He had his soils map there and showed me that in just 50 feet more we'd cut the clay dike. He said that \$200 was only an estimate and since the engineers were trying to give me the figure as near as they could guess it, I ought to allow some margin.

"Well, that young fellow missed his mark by 3 feet. At 47½ feet that dragline pulled out a chunk of dirt and it looked like a dam had broken. The water poured through the bank like a small river and has been running steadily ever since. You'd think they had broken through a cement wall instead of that innocent looking red streak about 6 inches thick that slanted up from where the water broke through.

"My swamp pasture dried up after this drain was dug and the basement rooms in the schoolhouse are dry, too. The crops sure looked better on the adjoining fields and with some leaching and use of corrective measures, it will soon be the best land on my place. This year I've plowed up the swamp grass and am farming that land, too."

Foutz solved his seepage problem with a soils survey—the first job a soil conservation district does before it tells a farmer how to plan his land for the highest production.

In another case, also in New Mexico, it took a rearranged irrigation system to bring 10 acres of seeped land back into production. This field belongs to A. F. Apodaca, who lives near Bernalillo, north of Albuquerque. Mr. Apodaca has a 60-acre farm which once included a wet alkali area of 10 to 15 acres. Nobody could remember when that wet area had produced a crop. A railroad dike on the west side of the field and the lack of drainage ditches had made it impossible to drain the place economically. Waste irrigation water from the rest of the field had been allowed to accumulate on this tract since the railroad dike was built.

The soils technician, called from Santa Fe to look over this problem, immediately saw that the

field had never been irrigated properly. The first job was to level the upper 50 acres. Soil-saving dikes were built and new lateral ditches, gates, turn-outs and drops were installed. The 10 acres were smooth-leveled, bordered, and planted to irrigated pasture. During the past growing season, nearly all the area produced a good crop of irrigated pasture.

This was the most practical and economical approach to the wet alkali problem when only one farmer was involved, but in another area of the Southwest, near St. George, Utah, a soil conservation district has mapped out a plan for draining 1,700 acres of land waterlogged because of poor drainage, overuse of irrigation water, and misuse of waste waters. An attempt to form a drainage district among the landowners involved there failed, but five or six farmers who stood to benefit the most have gone ahead with district recommendations. Working together, these farmers have built drains that will affect about 200 acres of land. Already from 20 to 30 acres that have been drained are in pasture crops. Immediate lowering of the

water table in this area brought enthusiasm from the farmers who first objected, and it is believed that eventually the plan to drain the whole area can be carried out as the district planned.

One hundred twenty acres of land owned by Alex Miller of Las Animas, Colo., have been drained under Bent County Soil Conservation District recommendations. This area once grew nothing but salt grass, swamp grass, and tules, but last year 40 acres of the reclaimed land were cropped to yellow sweet clover and furnished sheep pasture. The rest of the land would have been cropped had labor been available. Miller also took 89 sacks (11,347 pounds) of clover seed from this field the fall of 1946. Next year he plans a different crop for his new farm land.

These farmers have found that the advice of a trained soils technician made available by the Soil Conservation Service through soil conservation districts has almost always solved problems that stumped them. The variety of causes—the variety of answers—indicates that it pays to know all before a drainage operation is started.

GRANITE CREEK (Continued from page 141)

The Yavapai County Highway Department leased to the irrigation company a tractor with bulldozer, compressor, two pumps, a dump truck, and a cement mixer. One of the company stockholders, R. L. Walde, who irrigates 10 acres in Chino Valley, contributed concrete drain tile. The Prescott High School made available two more pumps, needed to dewater the foundation. Other necessary equipment was loaned by city officials and the State highway department.

Part of the foundation excavation was 25 feet below the stream bottom. The foundation had to be dewatered and part of the concrete was deposited under water. In spite of winter weather, rain, and numerous other construction difficulties, no accidents occurred and the job was completed ahead of schedule, and the dam was ready for use on February 25, 1946.

Actual cost ran to about \$11,300, which amounted to only \$19 per cubic yard of concrete. The company estimated the value of the engineering service provided through the district by the Soil Conservation Service at \$1,500. These services included preliminary investigations and surveys, detailed design studies, final plans and speci-

fications, construction schedule, and technical supervision of construction. Actual cost to the Government for these services was only \$750, or about 6 percent of the total job cost.

Herb Rees, water dispatcher for the Chino Valley Irrigation District, says: "With only about half a head of water turned in at the dam, we are getting as much water as ever down in Chino Valley. We owe this to the saving of water we are getting from the new Granite Creek diversion, for it is saving more water than I ever dared hope."

Yavapai County Agent John McLernon, who is an ardent booster for soil conservation says: "The construction of the Granite Creek diversion dam is the best example of cooperative community work I have ever seen. I attribute this partly to the efforts of Carl Clark, chairman of the Chino Valley Soil Conservation District board, and partly to the designs and specifications as drawn up by engineers of the United States Soil Conservation Service. This job shows excellent cooperation between the various agencies involved."

The district is now working hard on individual farm conservation plans to prevent water losses on farm lands and to save the soil. The Granite Creek dam was only the "opening gun" of an all-out conservation program in this district.

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WELLINGTON BRINK

Editor

Art Work by

W. HOWARD MARTIN

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business, with approval of the Director of the Budget. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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SUGGESTION TO OTHER DISTRICTS.—The district commissioners in the Johnson, Washington, Iowa, and Keokuk Soil Conservation Districts in Iowa (SCS work group 18) are sending a year's subscription to the SOIL CONSERVATION Magazine to the firms that contributed in a financial way toward the conservation field day and contour plowing contest held in September. The total number of subscriptions is 117. The commissioners also subscribed to the magazine and their subscriptions are included in the 117.

SUPERVISORS HIRE CREW.—Small concrete structures have trebled in number in Morrill County, Nebr., because of the purchase of equipment and the hiring of a concrete "crew" by the Morrill County Soil Conservation District during the past season.

Available on an hourly rental basis to farmers cooperating with the district, the crew efficiently and quickly built concrete irrigation structures as planned by Soil Conservation Service technicians assigned to the district. This arrangement provided many farmers with irrigation structures not otherwise available because of labor shortages.

Cost to the farmer, since it is figured by the hour, was reduced according to the labor furnished by him and it also repaid the district for its maintenance costs, salaries, and investment.

The crew consisted of three veterans and they were equipped with a complete set of modern, time-saving equipment and forms.



FRONT COVER.—

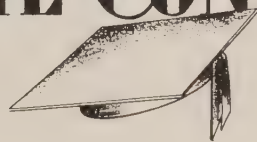
The oat crop zoomed under conservation measures on the farm of M. J. Pearson, Farmerville, La. These 18-foot strips lie above terrace channels. Nitrate of soda was applied, adding further to the yield.

Let's make 1948 the best year yet for conservation accomplishments on the land!

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Specialized Education

FOR SOIL CONSERVATION



By H. C. DIENER

ONE OF THE MORE RECENT SCIENCES in the educational field is soil conservation. Many of the practices used to prevent erosion are not new; a great many of the ways to raise the fertility of the soil are not new; some of the agricultural engineering methods used to carry water without scouring or gouging the soil are old in terms of years; reforestation and forest management for sustained annual yields on small woodlots on the farm are not in their infancy. However, the analysis of farm land in terms of soil, slope, erosion, cover, drainage, and other physical features, to determine the capability and adaptability of each acre, is new. This changing of land use to produce only those crops suited to the physical features of the land, the farm-management feature in farm work and farm organization, the use of soil amendments and supplementary practices, create what is known as conservation farming. Conservation farming is relatively new. That is why education for conservation farming is rapidly developing.

Young people who wish to have professional careers in agriculture are looking with much favor on soil conservation. The soil conservationist does not guess. He must work with facts. He must bring to bear specialized knowledge and rare good judgment to cure the ills of the land wherever they exist. He must have education designed to fit him for this profession.

The farm machinery manufacturing industry is developing specialized implements for conservation farming. These agricultural implement industries have been scouring the field for trained soil conservationists to aid in designing power tools for this type of agriculture. Even bankers

and creditors are asking that conservation farming be applied before extending loans to farmers. Their fiscal employees need conservation education.

The unusual demand by farmers, industry, merchants, and others for greater knowledge of soil conservation has led colleges and universities to expand their curricula. Soil conservation is now no longer a sideline to other agricultural sciences—it is a full grown science in its own right.

This expanding interest in special education in the field of soil conservation has led to the introduction in colleges and universities of specifically designed courses. These courses are labeled “soil conservation.” They teach students practical management of soils from the land-use side. They include: how to use land, soil amendments, tillage methods, crop rotations, soil conserving crops and practices, irrigation, drainage, adaptations of various farming systems to soil types, and many other features which make conservation farming possible and profitable.

More recently, many institutions of higher learning have integrated these courses with the necessary general agricultural courses, in a curriculum which grants a degree in agriculture with a major in soil conservation. This curriculum in soil conservation, in most cases, aims to give students a broad liberal education. It prepares them for intelligent practical farming; enables graduates to teach agriculture from the soil conservation angle, or to do professional soil conservation work with private agencies, and local, state, or Federal governmental agencies.

Nearly all of the agriculture colleges and universities in the United States have introduced one or more individual courses in soil conservation. Many allied courses have been developed which

NOTE.—The author is head, training section, Soil Conservation Service, Washington, D. C.

have as a guiding principle the element of soil conservation. Specialized courses in certain soil conservation practices and methods, such as terracing, building stock and water ponds, or water-flow retarding structures, have been made a part of the regular agricultural curriculum. Most of these have been developed as elective subjects to fill a gap found in the academic curriculum since soil conservation came to the front.

Training in soil conservation, the same as any other agricultural branch of learning, is based upon an understanding of all the sciences, and a knowledge of effective agricultural organization, practices, processing and marketing. In general, the colleges which have introduced soil conservation as a major study have followed the traditional pattern. The first 2 years are devoted mainly to the foundation sciences—botany, chemistry, physics, mathematics, English, and other academic subject matter. This builds a broad general background of education. The last 2 years have placed emphasis on agricultural subject matter, with soil conservation being the tie which binds the selected subject matter into an integrated curriculum.

Eleven of the State Land-Grant colleges and universities are now offering a degree in agriculture with a major in soil conservation. The 11 colleges which list such major, according to their most recent catalogs, are: The University of Florida, the University of Georgia, the University of Idaho, Iowa State College, Kansas State College, Louisiana State University, Michigan State College, the University of Nebraska, Ohio State University, Oregon State College, and the University of Wisconsin. There can be no doubt concerning the popularity of this educational trend. The fact that these institutions were willing to introduce courses and majors in soil conservation and provide instructors to supply this demand is ample proof.

All of this educational development in soil conservation has taken place since 1936 when the first books on the subject were written and the first college courses were introduced in the curriculum.

During the college year of 1946-47 approximately 1,363 students were enrolled in soil conservation courses in colleges and universities. In the first semester of the 1947-48 college year there are 1,554 students enrolled. Anticipating a similar increase in enrollment for the second semester would give approximately 2,600 students. This is an increase of 100 percent over last year. Most

of the 11 colleges which offer majors in soil conservation have introduced these curricula so recently that no correct measure of numbers of students for degree work can be given. However, indications point toward a large following being developed from those students who are taking specific individual courses.

Soil conservation, in general, is one of the newer postwar opportunities offered to the younger generation. Increased agricultural production to supply food to the world is, and will be for some years to come, a major problem.

Along with better types of crops and animals, better methods of control of insects and diseases, better implements and machinery, better fertilizers and soil amendments, soil conservation farming is a recognized method of increasing production. Education for soil conservation farming or professional soil conservation work has a place in the American academic field of schooling.

ONE THING LEADS TO ANOTHER.—Irrigation to the farmer means more than putting water on the land. It involves getting the land in shape for using water efficiently. It includes drainage. And it includes farming to prevent erosion.

E. J. Mitchell, near Bridgeport, Nebr., a cooperator with the Morrill County Soil Conservation District, is improving his irrigation system by leveling land, revising his water distribution, and repairing his drainage structures. Part of his drainage problem is to clear up 10 acres of water-logged land.

Mitchell has a 320-acre farm, but most of the western half could not be irrigated until the conservation plan he and the technicians worked out was applied. Leveling soil which had drifted from a sandy irrigated area into an old fence, and cleaning existing drainage ditches were two of the big jobs. They were done with equipment rented from the district.

The use of cover crops, crop residue management, grass in the crop rotations are part of Mitchell's conservation plan. Part of the land which had become drifted will be seeded to a mixture of alfalfa and brome grass for irrigated pasture.

Mitchell's irrigation improvement is characteristic of that which is in full swing in the North Platte area. At present, 18 contractors are busy in that territory working on jobs planned by district technicians for farmers cooperating with soil conservation districts.

SMOOTHING THE WAY TO PROFITS.—Leveling land so that it could be irrigated really paid out in higher yields this year reports Mrs. M. Sorenson of Arcadia, Nebr., a cooperator in the Valley County Soil Conservation District.

The land is a 9-acre field that formerly produced no more than 2 tons of alfalfa hay per acre, Mrs. Sorenson said. It was too irregular to irrigate. It was leveled, a border irrigation system was installed, and alfalfa was seeded in the spring of 1944. This year, the yield is reported as 5.9 tons of alfalfa hay per acre.

Land leveling and irrigation improvements are part of the farm conservation plan which she worked out with the help of Soil Conservation Service technicians aiding the district. Other parts of the plan include an improved crop rotation, fertilizing, good pasture management, and rearrangement of the fences.

Soil Sleeps Under

Fodder Blanket



Two-row corn-picker at work. It's self-propelled. The vegetation stays right on the land.

By WELLINGTON BRINK

AT THE TAIL-END of the 1947 harvest season I visited a number of farms in West Virginia's Panhandle to see some corn pickers at work. In this area the corn picker is a comparatively recent innovation. Therefore, it comes fitted with the very latest improvements which make it an increasingly potent force in the current agricultural revolution.

The picker now carries a dual wallop. It helps lick the labor problem and, in addition, it helps to conserve the soil. On both scores, the advantages are so obvious that its popularity far out-runs the available supply of machines. Many a farmer, lucky enough to get delivery on one, now harvests his own crop and also those of his neighbors—and out of his earnings he pays for the picker in a few weeks.

The new corn picker saves labor, time and money. At one fell swoop it removes ear from stalk, husk from ear, carries the ear back to a wagon for hauling to the crib, cuts up or shreds the stalks, leaves the shredded material on the ground

as mulch, releases the land immediately for other use, gives the farmer time to repair fences, build ponds, do many of the things he never before got around to doing.

Mrs. Hamilton Horner, on route 3 out of Martinsburg, started farm work at 8 years old. She loved the land and she loved machinery. She raked hay, mowed hay, harrowed. She learned about carburetors, gears, and generators, along with the lore of livestock, plants, and soil. She learned to repair and maintain both implements and land. In 1929 she inherited the farm, and to it she has continually added machines and implements which she had paid for out of their "custom" earnings. She has run hay balers and combines and, more recently, a corn picker.

"I don't think many of our farmers will continue to let corn sit out all winter waiting to be shucked," she told me. "These new pickers get the job done quickly, do away with the risk of spoilage, keep the manure and 'fodder' in the fields. A one-row picker handles about one acre per hour."

James H. Conklyn, district conservationist of the Soil Conservation Service, piloted me to key farms and key people in Morgan, Berkeley, and Jefferson Counties, all of which are included in

the Eastern Panhandle Soil Conservation District. *He gave me a roadside view of field after field, bedded down with disked-over "fodder,"* some of them already sprouting wheat from new plantings. Well over half the corn is being mechanically picked and the "fodder" left on the fields as a mulch.

Julian Everly, who both farms and serves as secretary-treasurer of the National Farm Home Association, kept comparative cost figures for two comparable fields he owns, one hand-picked and the other machine-picked. He told me that it cost him \$1.60 per shock—\$20.80 per acre—to harvest by old-fashioned methods, as against \$6.73 the modern way; and, of course, the machine gets the job done earlier, puts vegetation back onto the ground, and clears the way for the speedy planting of wheat over the whole field.

George S. Marlow, using a two-row picker, harvested 50 acres in 25 hours, and put 6,000 acres in the crib in jig time.

John C. Welsh is known as an adventurous farmer. He has an experimental turn of mind, is a close observer. He prospers, even under the handicap of bachelorhood. He started mechanical corn picking in 1940—probably the first farmer in his community to do so—with a one-row ma-

chine represented as having a seasonal capacity of 50 acres. Actually, he harvests as many as 400 acres. At top speed he shucks up to 700 bushels of shelled corn in 10 hours. He likes to see those big fat ears sliding through the machine, while the stalks stay on the ground. *Welsh finds that the clover and grass grow 6 inches higher after mulching.* "I get 10 bushels more of wheat or barley as a result of the practice," he says. "The soil is spongier, the fertility higher. And, of course, the lessened erosion is a mighty important factor. The water slows down when it hits the mulch. And the vegetative protection also prevents splash erosion by raindrops."

By the middle of September this year Welsh was through with his picking and got his barley seeded promptly. It didn't come up for a month. He turned his cattle in immediately. The weather was dry. As soon as the rains came, he took the cows out of the field. But Welsh claims that he turns the shoats in any time. Last year they browsed until Christmas—"and I made 35 bushels of wheat." They love those occasional kernels when they are beginning to sprout in the corn-shucks, and the sprigs of young grain. And they pay for this good eating by leaving manure in the fields.

ORCHARD IRRIGATION.—An orchard yielding from 5 to 6 bushels of peaches per tree is the result of a planned conservation program carried out by Leslie Bringhurst, Toquerville, Utah.

When Bringhurst took over the management of the farm from his father, he faced several tough irrigation problems. Irregular land caused water to accumulate in low areas and there was excessive erosion and loss of water. Bringhurst solved his problem by land leveling, but there were additional soil and water problems that required the assistance of soil technicians, so he asked the board of supervisors of the LaVerkin-Ash Creek Soil Conservation District for help. His major objective was to work out a complete program of soil and water conservation.

The plan, as worked out by Soil Conservation Service technicians, included the construction of approximately 1,000 linear feet of soil-saving rock terraces. The terraces have protected the soil and brought about efficient disposal of waste water. The plan also called for a revision of the irrigation system for irrigating at right angles to the slope, rather than down the slope. Irrigation runs were shortened and 22 headgates, which save considerable labor, were installed.

Today there is no run-off from the Bringhurst farm. A sweet-clover crop is maintained on the orchard to hold the soil and supply nitrogen. Trashy cultivation leaves the major portion of crop residues on the surface, thus preventing the formation of a crust.

This type of tillage also eliminates competition for soil moisture between the cover crop and trees. A portion of the crop is worked into the soil for green manure, which increases the humus of the soil and allows greater penetration of moisture. Bringhurst also applied barnyard manure to the orchard, which increases the moisture-holding capacity of the soil. Ammonium phosphate is applied to the orchards at a rate of 200 pounds per acre.

This planned conservation program produced trees uniform in size and shape, and a peach crop high in quality and above average in yield.

RIGHT LAYOUT SAVES HEADACHES.—Easier and quicker irrigation results from improvements as a part of a farm conservation plan, reports George Hedges near Central City, Nebr., a cooperator with the Merrick County Soil Conservation District.

Hedges has about 150 acres under irrigation from two wells. He started development of the system 4 years ago. He was well along with the system when he started cooperation with the soil conservation district and received aid from Soil Conservation Service technicians.

"We got a pretty good system of ditches laid out on most of the land by trial and error," Hedges explained, "but after we started cooperation with the district we really learned what it means to have technical help."

"Some changes were made in the existing layout that improved it, and on land not yet irrigated the technicians' help enabled us to make the layout right the first time. That saved both labor and expense."

The net result, he added, is that water can be applied to the fields in less time than formerly.

Hedges goes on to explain that besides saving work and time, improvements in the irrigation system enable him to apply water uniformly over the field. Thus, no part needs be over-irrigated in order to get water on other parts of the land.

"It seems to me," Hedges remarks, "that it's necessary to keep from getting too much water on the land. It'll seep the plant foods down just as where rainfall is heavy. Good irrigation prevents that—and it's decidedly a part of soil and water conservation."



One-row pull-type corn picker. It takes the ears, leaves the stalks in field.

Japanese beetles were at their worst in 1947. Welsh, however, was troubled very little by them. He planted early and—thanks to the corn picker—he also harvested early. “It’s the late beetles that hurt,” he says.

W. N. McClung, Berkeley county agent, figures that on his own farm the cost of harvesting by the old methods runs to 40 percent of the crop, or 16 bushels per acre. With mechanical picking, however, harvesting is accomplished for \$6—or 3 bushels—per acre. “The food value of the fodder is more than offset by increased wheat production from mulching,” he finds. “And there’s another factor, sometimes overlooked. About 1 acre in 10 is taken up by the shock rows, which are eliminated when picking is accomplished by machine.”

F. M. Welsh, brother of John, is convinced that “we are doing better farming than we did 25 years ago. It’s good soil conservation practice to leave the ‘fodder’ in the field. Any time we put humus back in the ground we improve production.”

J. E. Saville, Jefferson county agent, points out that most pickers work at highest efficiency in the morning when the corn is not too dry.

Most farmers, however, report generally clean results under all harvesting conditions. A great deal depends upon the individual operator and still more depends on the machine and its equipment.

Some farmers told me that sweet corn can be harvested perfectly.

Disking is very generally practiced—a method which effectively cuts up the stalks in the field and leaves the “fodder” as an excellent mulch. Still more modern, time-saving equipment is moving into this area, however—equipment which shreds the fodder, effectively crushes cornborers, and creates an even better mulch than disking.

The corn picker, arriving simultaneously with the soil conservation movement in the Eastern Panhandle, has kindled the imagination of farmers, landowners, and equipment specialists. The labor scarcity has served to fan the flames. They are talking about the opportunities awaiting pickers that shell the corn from the ear, and of drying equipment for handling the shelled corn right on the farm.

George Heidrich, district supervisor, sees in the corn picker a great conservation tool, the implication of which extends far beyond its use in speeding crop to crib. The picker is an example of the fact that both farmers and manufacturers are becoming conservation-minded; that just about all modern farm gadgets are being developed within the pattern of the conservation idea, with a view to adapting every mechanical innovation to the furtherance of soil-conservation and soil improvement.

SCIENCE TELLS US HOW TO GROW CORN

By A. E. McCLYMONDS

WATER lost through up-and-down-hill farming on sloping, fairly heavy land this year was apparently worth about \$15 per acre to farmers, figured at present corn prices.

At least, that's the experience this year at the United States Soil Conservation Service experiment station near Hastings, Nebr., where small watersheds are farmed in various ways in order to measure the influence of conservation farming in controlling floods in small tributaries.

The experiment station is on the Matie Eigenberg and Fred Lampman farms, 22 miles south of Hastings. The watersheds are similar, and the same crop rotation has been used on all of them during the last decade. Seven of the watersheds were in corn this year.

Fourteen and two-fifths bushels of corn per acre was the yield on the watersheds farmed up and down hill, with a 3-year crop rotation of corn, wheat, and oats. That is, corn is planted there every third year.

On the watersheds where contouring was added to the crop rotation to conserve water, however, the yield was 20.9 bushels per acre—6½ bushels more than on the straight-rowed watersheds.

And on the watersheds where subsurface tillage is practiced for all crops in the rotation, the yield was 20.7 bushels per acre, about the same as on the contoured watersheds.

Low as the yield was on the watersheds at the station that are farmed up and down hill, it was double the yield at many places in the territory where the practice has been to grow corn on the same land year after year.

Few, if any, of the fields examined in Adams County are estimated to yield more than 5 bushels of corn per acre—if it is harvested. That is 16 bushels less—about \$36 less at present corn prices—than was produced per acre in the watershed where subsurface tillage and a crop rotation are practiced.

On the face of the figures, the crop rotation alone was worth in the neighborhood of \$20 or \$21 per acre in terms of corn production. And the addition of the other soil and water conserva-

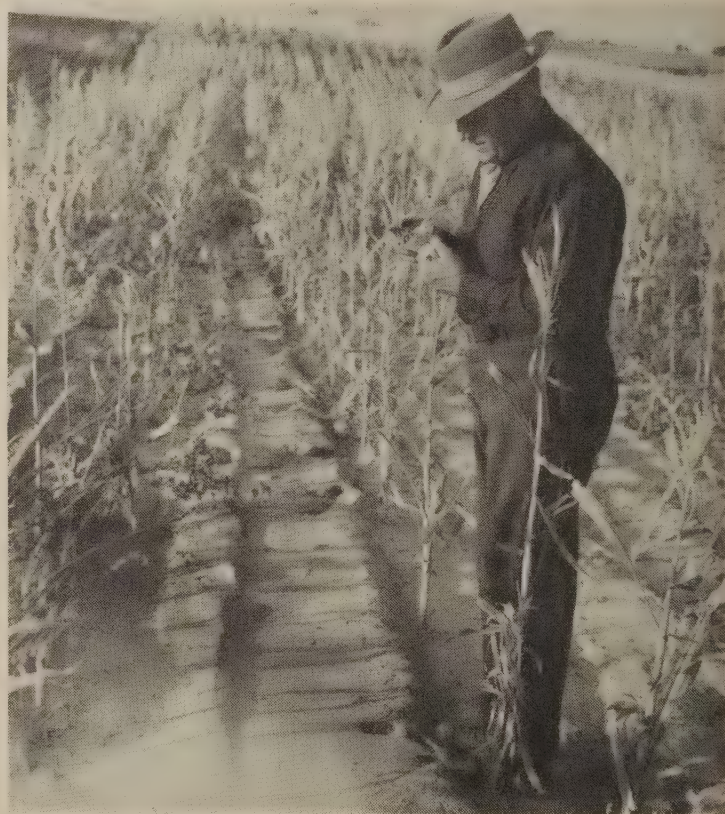
tion measures, which increased the amount of water that went into the soil, increased the earnings per acre of the land still more—about \$15 per acre more at present prices.

How much greater, if any, the corn production would have been with complete conservation applied isn't known. None of the watersheds where that has been done was in corn this year.

Probably at least as important as the greater earnings to the individual, however, is the loss of corn through lack of conservation in this year when the Nation's corn crop is short.

Right now, everyone is urged to conserve food in order that enough will be available to relieve the sorry plight of most of the rest of the world. Yet, it is entirely possible that, had complete soil and water conservation been general, the necessary food could have been raised without difficulty.

And every bucket of water that can be held up on the land where it can help crops is a bucket less in the small streams that so often are sent out of their banks to damage bottomland crops and towns and villages.



This is the field from which the small corn plant shown in the other picture was taken. It is typical of the straight-rowed corn south of Hastings, Nebr., seen last year when a hot, dry summer followed a wet spring.

NOTE.—The author is regional conservator, Soil Conservation Service, Lincoln, Nebr.



Study in contrasts: A nubbin goes visiting a lusty neighbor. The nubbin is from a field kept in corn for years and farmed up and down hill; yield, not over 5 bushels per acre. The better corn, seen in this field, is a product of contour farming and crop rotation; yield 20.7 bushels per acre.



Close-up of hairy vetch and abruzzi rye; root system holds soil together, helps improve tilth.

Hairy Vetch the Versatile

By W. M. NIXON

HAIRY VETCH is a staunch warrior valiantly fighting the battle of soil erosion and depletion in Arkansas, Louisiana, Oklahoma, and Texas.

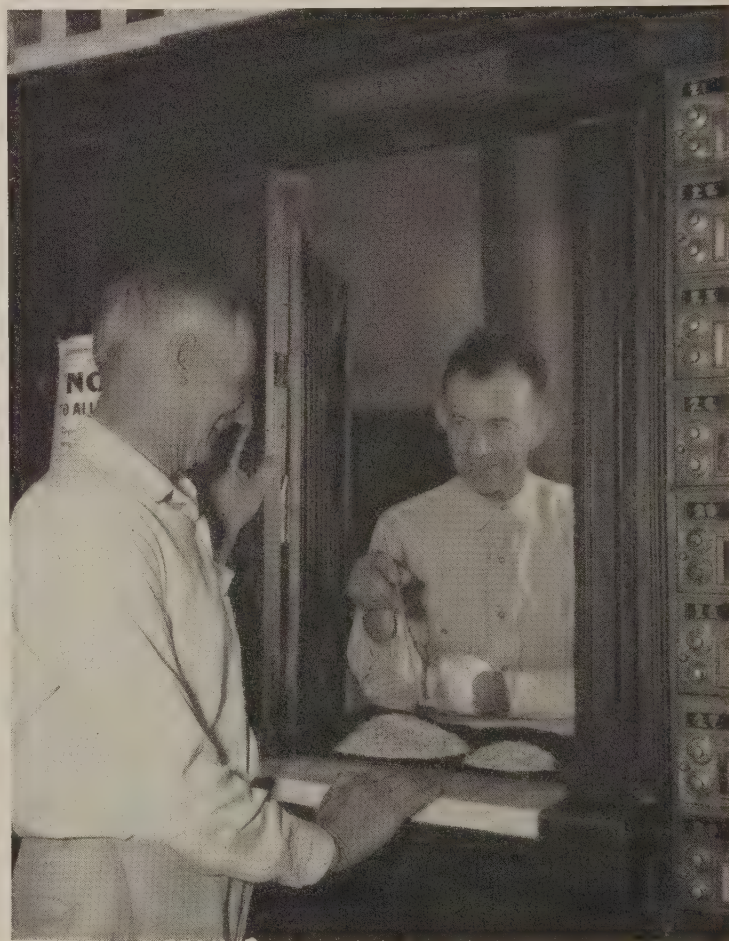
Though this legume has been grown to a limited extent for many years in parts of this section, only during the past 10 years has it assumed a major role in the soil conservation program. Fresh impetus has been given to its use by successful pioneering work on seed production in soil conservation districts in the Cross Timbers area of Texas and Oklahoma. Within the short span of 5 years the Cross Timbers has become a major hairy vetch seed-producing area. A considerable volume of seed is produced also in Arkansas.

Hairy vetch is a versatile crop: It protects the soil against erosion, improves the soil by supplying nitrogen and organic matter, furnishes good grazing, makes good hay, and puts extra cash in the farmer's pocket when seed is sold.

When used with other soil conservation practices in an integrated program, hairy vetch is extolled by farmers for its many virtues. Here are some typical experiences reported by soil conservation district cooperators:

NOTE.—The author is regional agronomist, Soil Conservation Service, Fort Worth, Tex.

Lowrey Walker, manager of the Walker Brothers' farm near Springdale, Ark., in the Benton County Soil Conservation District, tells of getting 12 percent more apples after planting a



Vetch increased the oat yield from 15 bushels per acre to 60 on the farm of G. F. Wimberly, postmaster of Perrin, Tex. He illustrates the feat with 16- and 4-ounce piles, for the benefit of J. M. Dickenson, smiling supervisor of the Upper Leon Soil Conservation District.



Harvesting hairy vetch for hay on a farm near Chickasha, Okla. The vetch in the background is being kept for a seed harvest.

vetch-rye cover crop. This figures out about \$72 per acre more revenue. A crop of vetch turned under for green manure, Walker calculates, is equal to a car of Kansas City fertilizer. "But," he declares, "the big advantage is that the vetch and rye crop makes the land so mellow it takes up most of the rain. During many of the spring rains there wasn't any run-off. And, of course, there was no soil washing."

Howard Anderson, Fayetteville, Ark., thanks his soil-building hairy vetch for his having grapes worth harvesting when many of his neighbors lost theirs because of a hard freeze at a critical time. Anderson got the benefit of the higher prices resulting from a short crop. His revenue from grapes was only 18 percent less than it was the year before, instead of being cut by half or more, as was the case generally in his locality. "My experience in previous years," Anderson said, "is that vetch boosts grape yields about a ton per acre, besides checking erosion."

John O'Neill, Marshall, Okla., reported to his Cottonwood Creek Soil Conservation District that his wheat crop more than doubled after the installation of his conservation program which included vetch as a soil-improving crop. Wheat following a green manure crop of vetch yielded 22

bushels per acre; without vetch, 10 bushels. All wheat was planted the same day.

L. T. Cathcart, Grapevine, Tex., Dalworth Soil Conservation District, reported that when corn followed vetch he got 40 bushels per acre, whereas "if I get 10 bushels per acre from the corn following peanuts I feel that I'm lucky."

F. L. Lemley, McGuire, Tex., Swisher County



This vetch on the W. W. Miller farm near Natchitoches, La., will be turned under as green manure and followed by soy beans. Corn was grown after turning vetch under the two previous years. Before vetch was used the average corn yield on this farm was 10 bushels per acre; after vetch, 40 bushels. Vetch increased his cotton yield from 100 pounds of lint per acre to 550 pounds.



J. B. Eberheart, of Rising Star, empties vetch and rye seed into a small electric seed cleaner while an assistant pours the clean seed through a gravity-flow seed separator.

Soil Conservation District, overseeded wheat stubble with hairy vetch 2 years ago, the field consisting of light, blow-type soil of low fertility. He kept the field in wheat and vetch for 2 years as pasture before planting it to sorghums. As a check, he planted the same acreage without vetch. All sorghums were planted the same day and received the same treatment. When he combined the sorghums from both areas, Lemley found by actual measurement that the vetch land produced 16 bushels per acre more sorghum than the area not having the benefit of this green manure crop.

Delmar Pearson, supervisor of the Cottonwood Creek Soil Conservation District, has found hairy vetch to be a profitable crop on his 480-acre wheat and livestock farm located 7 miles west of Guthrie, Okla. Pearson calls vetch a "five-in-one" crop. Of 80 acres of vetch, all was used to some extent for supplemental pasture, 40 acres were used for hay, producing more than a ton per acre, 30 acres were plowed under as green manure; 20 acres were harvested for seed; and the entire 80 acres were well protected against erosion. More than 200 district farmers toured Pearson's farm and saw

at first hand why hairy vetch should be included in a conservation crop rotation. "I know that my wheat yields have increased almost 50 percent since I began using vetch for soil improvement," Pearson told the group.

John O'Neal, also a supervisor of the Cottonwood Creek Soil Conservation District, is outspoken on the value of vetch for soil improvement. "My wheat following vetch grew faster, was stronger, the heads were larger, the seeds more plump and of better quality, and the yield was more than doubled," O'Neal said. He farms near Marshall, Okla.

W. B. Ingram, who farms 5 miles east of Shawnee, Okla., in the Shawnee Soil Conservation District, has done much to increase vetch acreage among the farmers in his group. Ingram "practices what he preaches." He plowed under 30 acres of vetch as a green manure crop and last summer harvested more than 11,000 pounds of clean seed from 25 acres. Ingram plants wheat and vetch together and separates the seed after harvest. "Vetch in the rotation has increased corn and oat yields more than one-third," he said.

George Yarbrough, dairyman near Shawnee, Okla., found hairy vetch to be exactly what he needed to provide off-season green forage and to help improve his soil productivity. He first planted vetch on 5 acres of depleted land in the fall of 1944 as part of the combination of conservation measures he follows under his cooperative agreement with the Shawnee Soil Conservation District. Finding that the vetch provided nutritious grazing for his cows in late winter and early spring when other farmers had only dry feed to offer, Yarbrough has since increased the acreage planted to this legume.

W. H. McCormick, Rogers, Central Texas Soil Conservation District, who farms deep, black, waxy soils of the Blackland Prairie, said: "Vetch land plowed as easy as anybody's east Texas sandy land but when I'd turn the cross row into the field that had grown cotton last year, my plows would turn up clods as big as my head and as long as my leg. My tractor operated in the vetch with the throttle down only 3 notches but it had to come down 6 or 7 notches in the adjoining field. I figured that I used a gallon of gas per acre on the field where vetch was planted and a gallon and a half on the other field."



C. E. Barnhill (left) and E. S. Cordell, technician of the Soil Conservation Service, ponder ways to fill this gully and control its washing. They hatch their plans with a view to getting eroded, idle land back to production through an integrated program of soil conservation.

HIS FENCES COST MORE THAN THE FARM

By E. S. CORDELL

WHEN FENCING COSTS more than the farm property to be enclosed, you can be sure that the land is pretty well run down.

That was exactly the experience of C. E. Barnhill of Hugo, Okla., chairman of the board of supervisors of the Kiamichi Soil Conservation District, who recently went into the ranching business for himself after 17 years of successful management of the Echo Ranch west of Hugo. Barnhill bought three adjoining pieces of land totaling 440 acres and planned to buy an 80-acre tract to give him a 520-acre unit. He then paid out more for fencing material—wire and bois d'arc posts—than he did for the land.

As might be expected, the land was cheap in these days of high prices because it was badly eroded and depleted of fertility. The 440 acres once comprised three farms that supported three families. When Barnhill went to Hugo 20 years ago, the land was doing well, producing cotton, corn, peanuts, and grain sorghum. When he bought the 440 acres, however, the land had been idle for 10 years and the three families had moved

away, unable to make a living on these farms any longer. Erosion had taken its toll. Farming methods that allowed the soil to wash and blow away had reduced the land to a state of poverty. A 160-acre farm that comprised part of the 440 acres Barnhill bought sold for \$12,000 in World War I. He picked it up for a song from a loan company. The improvements on it had been destroyed by a tornado in 1927 but the reason the 160 acres went for so little was that the land was simply played out—eroded and unproductive.

In fact, when Barnhill bought it, the land was scarred with gullies and shabby in its cover of sedgegrass, needlegrass, weeds, and sassafras, invading plants that follow in the wake of erosion. On one of the old farms a previous owner had recognized that erosion was eating away the top soil and had tried to do something about it. He built terraces which can still be seen. But lacking engineering knowledge, he built them wrong and they merely speeded up the erosion.

"The fellow did the best he could," Barnhill commented as he pointed to one of the old terraces. "He recognized that something was needed to stop the erosion that was robbing him of his soil. But he didn't have the technical skill to put his terraces in properly. That shows again that

NOTE.—The author is district conservationist, Soil Conservation Service, Hugo, Okla.

there's no way of getting around the fact that in planning and building terraces you have to have the help of technicians trained for the job. The same thing is true about other conservation practices."

Barnhill has been an advocate of soil conservation for many years. He practiced conservation on the Echo Ranch, having installed a coordinated program with the help of Soil Conservation Service technicians working with the Kiamichi district. For its outstanding conservation work, the ranch was awarded a certificate of merit by the Oklahoma Bankers Association.

Barnhill is confident he can restore the eroded and depleted land he has bought to profitable production through conservation measures. He's going to develop the land into pastures for cattle, sheep, and goats.

"The first thing to do to develop a pasture is to fence it," he said. "The next thing is to run in sheep to cut the weeds out." Some ranchers will argue with him about the sheep but he is convinced they perform this useful function better than anything else. He planned to use goats to get rid of undesirable shrubs and brush.

Barnhill's conservation plan included fencing the entire area, with cross fences to divide the land into a number of pastures so that grazing can be rotated and the stock can be taken out of any

one pasture at seeding time to give the forage plants a chance to re-seed. His program also called for clearing the sassafras bushes and installing fire breaks. Other measures were terracing to slow down run-off and give the soil better chance to absorb rain; sodding the entire place to Bermuda grass; spreading 2 tons of lime and 200 pounds of phosphate per acre; and overseeding with Korean lespedeza and white Dutch and other clovers suited to the soil and climate.

Barnhill planned to start his own ranch operations with 50 head of Brahma grade cattle, 150 goats and 30 sheep. When the forage reaches peak development, he expects his place to support twice that number of livestock. He planned to raise all his own feed, buying only concentrates. Seven acres were set aside for orchard and truck garden. He has moved a dwelling to the place and remodeled it as his residence.

"This land has got to produce a living for me," he declared confidently as he set about changing idle, unproductive land into a useful and profitable ranching enterprise. To date 20 acres have been terraced, a farm pond has been built, 13 acres of sericea lespedeza have been planted for hay production and 14 acres of bur-clover, black medic, and ryegrass have been sown for winter pasture.

GRASSES AND LEGUMES TESTED ON LAND UTILIZATION PROJECTS

By **R. Y. BAILEY, L. B. SCOTT and
L. J. LEFFELMAN**

WE ARE FINDING new and broader uses for land utilization projects in the Southeast. Project lands are serving as further proving grounds for new grasses and legumes that have shown promise in Soil Conservation Service nurseries. New species are being planted on full field scale so as to get more information than is possible in observational nurseries.

Large numbers of grasses and legumes are

NOTE.—The authors are chief of the regional agronomy division, chief of the regional nursery division, and chief of the regional land management division, respectively, Soil Conservation Service, Spartanburg, S. C.

studied in the observational phase of our regional nurseries. These observational studies are carried on under memoranda of understanding with the Bureau of Plant Industry and State agricultural experiment stations. New plants that appear to have promise in a soil and water conservation program anywhere in the southeast are studied in the observational nurseries.

New species are collected from the wild or other sources; obtained from State experiment stations, other regions of the Service, the National Observational Nursery, Beltsville, Md., the Bureau of Plant Industry, or from farmers. Those that show promise for use in the field as soil-conserving plants are increased in seed-production blocks.

One of our most difficult problems is to be sure that a new species is worthy of distribution after a supply of seed is available in the nurseries.

State agricultural experiment stations are not able to test all of the many promising species for us. They are furnished seed of promising new plants upon request, but they often have no facilities for carrying studies beyond small plots. Such plots give little information that we have not been able to get in our observational nurseries. They do not have the land nor the personnel for large-scale testing of plants.

We must know about the possible usefulness of new plants with as little delay as possible, because of the urgent need for adapted plant material in



Ladino clover in a pure stand at left has made excellent growth, whereas the clover at the right is completely overtopped by Kentucky 31 that is almost ready to be harvested for seed in seed-production areas at Chapel Hill nursery. Large-scale plantings on both upland and lowland at Dalton will give an opportunity to observe these two vigorous perennials in mixtures when grazed by livestock.



Pensacola Bahia grass made a dense sod on sandy soil at Americus, Ga., nursery. This sod needs to be enriched by a legume to increase its palatability and feed value. The extensive acreage of land at Land Utilization projects can be used for field plantings with various legumes under grazing conditions.

some of the soil conservation districts the Service is assisting.

Our problem of seed distribution is illustrated by Pensacola and Wilmington Bahia grass (*Paspalum notatum*). These are narrow-leaf strains of Bahia grass that grow well and produce dense sod on light sandy soils where other pasture grasses are poorly adapted.

Pensacola Bahia was found near Pensacola, Fla., and has been accepted by agricultural agen-



Ladino clover in a mixture with rescue grass made a beautiful sod in mid-April at the Chapel Hill nursery. Field plantings on LU lands will give an opportunity to study such sods under grazing.

cies in the State as a good grass. There is a heavy demand for seed in Florida and we produce seed at our Americus, Ga., Thorsby, Ala., and Brooksville, Fla., nurseries for distribution to soil conservation districts in Florida.

Small amounts of seed for observational plantings on sandy soils were distributed to districts in other States in 1945 and 1946. Seed was sent to these districts with the understanding that the district supervisors would select farmers who would plant it in 5-acre patches for observation. These patches also would be used for seed production, if the grass proved useful and local farmers who observed it decided they wanted more of it.

Wilmington Bahia was found near Wilmington, N. C. It resembles Pensacola Bahia, but is more cold resistant. Wilmington Bahia has survived the winters at Chapel Hill, N. C., and Rock Hill, S. C., where the stands of Pensacola Bahia were thinned by cold. We are producing seed of Wilmington at Rock Hill and Chapel Hill for use in areas where Pensacola does not survive the winters.

Seed for a few observational plantings of Wilmington Bahia was distributed to a few districts in 1945 and 1946. These plantings were of the kind described for Pensacola Bahia.

Farmers have been pleased with the way their cattle grazed the narrow-leaf Bahia grasses in these early plantings. William Ballentine, Newberry, S. C., planted an acre of sandy land in his pasture to Wilmington Bahia. He limed and fertilized the land, as he did the rest of his pasture, and seeded clovers and lespedeza with the grass. His cattle grazed the Bahia closer than they did other grasses in his pasture during the entire 1947 season. Pensacola Bahia that was mixed with legumes in several pastures likewise was grazed closely in observational plantings.

Results of grazing trials at the Georgia Coastal Plain station at Tifton left doubt in the minds of members of the station staff about Pensacola Bahia on soils where other useful grasses are adapted. The dense Bahia sod competes with Bermuda and other grasses in pasture mixtures. Bahia tends to be tough and unpalatable in summer if not closely grazed, particularly where it is in pure stands. It also is scattered to all parts of the pasture by the cattle. This suggests that until we know more about these grasses we must exercise care in planting them on sandy upland; that

is, in the same pasture with lowland where other grasses are grown in mixtures with clovers.

The eradication of the narrow-leaf Bahias is a problem about which little is known. We need to know how difficult it will be to kill these grasses in established sods and how persistent they will be from seed that ripened and dropped on the ground in previous years. We started eradication studies at three nurseries in 1946 and expanded them in 1947. These eradication studies include enough acreage to permit a thorough study of different methods of cultivation to determine the persistence of the grasses where the soil is well stocked with seed. Various sown crops are being planted after varying degrees of mechanical disturbance of the sod. These plantings will give information about the possibilities of smothering the young Bahia seedlings that may come up and also will give information about the growth of various legumes in mixtures with Bahia. These studies were discussed with members of the Tifton station staff who are anxious to have us get the information about eradication and of management in mixtures with legumes.

We have seen evidence in observational plantings that legumes can be grown with the Bahia grasses and that animals will eat these grasses during the entire summer and fall when they are in mixtures with legumes. We have had promising results with Caley peas (*Lathyrus hirsutus*) as a volunteering winter legume with Bahia grasses at the Americus, Thorsby, and Rock Hill nurseries. Peas came up through the dense grass sod in the fall and the grass remained green during the entire summer and fall after peas matured and died in the spring. This is a promising legume to grow with Bahia grasses on sandy soils where clovers are not adapted.

In spite of the promise both Pensacola and Wilmington have shown in observational plantings in nurseries and on a few farms, we are continuing to limit seed distribution to Florida and to a few farms in sandy sections of other States. We must know more about these grasses before making extensive distribution of seed outside Florida. The Bahia grasses have shown too much promise, however, to justify discarding them or waiting indefinitely for information about their possible usefulness. We cooperate with many soil conservation districts where adapted grasses are needed on extensive areas of poor sandy soils.

Our need for further information about the

Bahia grasses was outlined in detail to give an example of what we face in the distribution of new species. We must be sure that we are not distributing plants that will become undesirable pests, but we are in immediate need of adapted vegetation on large areas where we now lack suitable plants. We need a way to get such information as quickly as possible and under conditions like those on farms.

The Land Utilization projects are in several different soil provinces and offer unusual opportunities for extending our observational studies of plants about which we need additional information. We have plenty of lowland and upland on these projects. These lands are being developed for grazing, and new grasses and legumes from the observational nurseries can be seeded as cheaply as the other plants that normally would be used. This permits large-scale plantings of the new species without any increase in the cost of project operation.

Grazing is an important phase of observation work. Grazing cannot be done at the regional nurseries because we do not have the livestock, the fences, nor the personnel that would be required. Likewise, the State experiment stations usually are not in a position to make as extensive grazing studies as we would desire because they already are doing as much grazing work as their facilities will permit.

After grazing land at the Land Utilization projects is developed, farmers pay a monthly rate for livestock pastured. Personnel at the projects look after the different tracts in which livestock are pastured and it will be no extra trouble for them to make necessary general observations of the way animals eat the different species during the grazing season and to observe the condition of the animals.

This general observational study will not give information as useful as could be had through definite research under controlled conditions, where detailed studies could be made and quantitative results obtained. This approach simply affords us an opportunity to carry observational studies through a field-scale phase before offering seeds or plants of new species to soil conservation districts.

Observational plantings of species from the nurseries have been made at several of the Land

Utilization projects during the past several years. Rather large-scale plantings of Caley peas were made on both kudzu and sericea on very poor sandy soils at Tuskegee, Ala. Gandiflora vetch was seeded at Tuskegee and small areas were planted to sweet lupine and other species.

Wilmington Bahia grass (*Paspalum notatum*) was sown on 10 acres of a 100-acre pasture on sandy river bottom soil at Greensboro, Ga., in 1943. A well-distributed stand of the Bahia grass was grazed by cattle in the summer and fall of 1947. The grass was eaten as readily during the summer as Bermuda and Dallis grass, which were in the sod. In the late summer and early fall, Bermuda grass was not grazed closely during an extended drought and, to our surprise, Bahia was grazed as closely as Dallis grass. This does not give us conclusive information about the value of Wilmington Bahia grass on sandy soils, but it adds much to the information gained in the observational nurseries.

Weeping love grass (*Eragrostis curvula*) has grown well on poor soils in observational nurseries. This grass was grazed closely by livestock in limited plantings in one of the pastures at Dalton, Ga. Additional seedings were made on poor soils at Dalton and growth was good. We still lack much information about the possibilities of love grass, particularly in mixtures with legumes.

Our experience at the projects where different species were planted was so satisfactory that we decided in the spring of 1947 to make a more comprehensive study of several grasses and legumes at Dalton. We visited the project in late May with a representative of the State office, the district conservationist, and two nursery managers, to plan several different combinations of grasses and legumes for seeding in the fall of 1947 and the spring of 1948.

Among the observational seedings planned are: drilling Kentucky 31 fescue on old stands of sericea in the fall; seeding a mixture of fescue and sericea together in the spring; seeding rescue grass (*Bromus catharticus*) on sericea in the fall; seeding Caley peas on stands of kudzu and sericea; sowing hard-seeded crimson clover on kudzu and sericea; seeding mixtures of Ladino clover and fescue on lowland and upland; sowing fescue and Wilmington Bahia grass in a mixture to determine whether either will crowd the other out; seeding

(Continued on page 168)

DRAINAGE KEEPS WILLOW GROVE



"High
and
Dry"

Willow Grove after completion of drainage system. Looking upstream on the Columbia River (right).

By HERBERT BODDY

FOR YEARS HIGH WATERS from winter rains and spring freshets kept the people of the Willow Grove community, near Longview, Wash., on the defensive. Today, the outlook is bright for the little dairy settlement that turned to conservation farming to work out its problem of too much water.

Willow Grove's 34 landowners, members of the Cowlitz Soil Conservation District, scrapped their old drainage system for a new way of handling surplus water. The Longview office of the Soil Conservation Service laid out a drainage system which effectively drained all of the settlement's swales, ponded lands, and 100 acres of idle sedge.

Some Willow Grove landowners recall that in 1933 they crossed their flooded pastures in boats in one record rainfall period. Later, in an average season, from 3 to 4 inches of water covered the flat, diked-in lands. Ponds dotted the pastures and water from the ditches spread over the fields. Under these conditions, the landowners agreed, farm production fell far short of the mark they believe their farms should have yielded.

By the time the Cowlitz Soil Conservation District was voted in 1945, the people of Willow Grove were ready to do something about their waterlogged pastures.

A group of dairymen laid their drainage prob-

lems before the district governing body of the Cowlitz district. The commissioners of Diking Improvement District No. 15 sought aid, too, in improving their old drainage system. The district supervisors took up Willow Grove's water problems with Forrest E. Bernath, head of the district office of the Soil Conservation Service in Cathlamet, Wash., who worked out a year-around drainage system for the community.

Tom McGourin headed a three-man crew of technicians and engineers who surveyed the drainage problems of 34 farms. They were given specialized aid from Francis K. Museus, in charge of drainage work for the regional engineering division in Portland.

When the technicians went over the ponded and waterlogged areas, they checked the amount of soil conservation work that had to be done. They took note of the work required to dry up the idle sedge land, drain pastures and croplands, and put all the farms on a capacity-yield basis. They then outlined a new drainage program at a meeting of the district governing body, diking commissioners, and farmers.

Bernath explained that around 19,500 feet of diking district ditches would have to be widened and deepened and 24,000 feet of new ditches constructed to keep the community "high and dry."

The Service's field staff next gave technical assistance to the district supervisors and diking commissioners. They staked out the pattern of new ditches to crisscross the farm lands. They marked out field boundaries to conform to the course of

NOTE.—The author is assistant in the current information section, Soil Conservation Service, Portland, Oreg.

the ditches and they listed the drainage ditches that had to be constructed. Technicians also recommended the conversion of the manual-type pumping plant to automatic type to give around-the-clock control over the drainage water.

Dragline operations and ditch construction work were let on contract to a local firm. By the end of 1946 Willow Grove landowners had a completed drainage system that was dry as a chip less than a year after Cowlitz district was formed.

A real test came last winter when rainfall totaled 14 inches in 8 days. Within 24 hours after the rains stopped, the water level in the ditches dropped to the fall average of three feet below ground level.

Around 41,500 cubic yards of diking district and private farm spoil banks were leveled off in the area during 1947. Willow Grove farmers have begun applying land-improvement practices under the complete land-use program worked out with the district supervisors and the Soil Conservation Service.

Two Willow Grove farmers, J. William Amtilla, a supervisor of the Cowlitz Soil Conserva-

tion District and chairman of the board of diking commissioners, and C. E. Fisher, a dairyman, sum up the opinion of the community's farmers.

Says Amtilla, "We expect to be able to farm our lands at least 10 days sooner each spring as a result of our new drainage system. The increased forage I will get from my drained pastures will enable me to double the size of my dairy herd."

And Fisher remarks, "I believe Willow Grove stands to gain everything from the new drainage ditches the Soil Conservation Service helped us put in. Getting rid of the sedges and draining my land will give me the chance I've wanted to seed better grasses and legumes. By applying the practices set forth in my farm-conservation plan, I should double my forage. I am milking 34 cows now and I expect to be able to step the herd up to 50 before many months."

Since completion of the Willow Grove drainage program, requests have been received by the supervisors for similar technical assistance from three of the five other diking-improvement districts in Cowlitz County.



Willow Grove farmers expect to double output as result of drainage. In this view can be discerned drainage ditches before leveling of spoil banks. At left—center—are brush piles from newly cleared area. Dark area at right—center—is sedge, indicative of poorly drained land. Pump house and tide gates are at apex of bend, upper right.



Honor Awards Ceremony on Monument Grounds

Bennett and Anderson . . .

Hafenrichter . . .

Johnson . . .

Bailey

IN CEREMONIES attended by more than 2,000 persons at the wind-swept Sylvan Theater on Washington's Monument Grounds, the Department of Agriculture on November 12, 1947, recognized with medals and citations the outstanding services to the public of a number of its employees. The impressive program, presided over by Secretary Clinton P. Anderson and enlivened with music by the Navy Band, inaugurated a custom to be observed annually.

Dr. Hugh H. Bennett, Chief of the Soil Conservation Service, was the first of five individuals to receive the Department's Distinguished Service Award. To him went a gold medal and a warm personal felicitation from the tall Secretary of Agriculture, accompanied by the official citation: "For his achievement in the field of soil and water conservation which has benefited American agriculture and contributed to the welfare of people throughout the world."

Richmond Y. Bailey, otherwise known as "Dick" or "Kudzu," was presented with a silver medal—a Superior Service Award—together with commendation for "service to Southern agriculture in the field of soil and water conservation, through his work on diversification, land improvement, and stabilization." Bailey is regional chief of agronomy, with headquarters at Spartanburg, S. C. His colorful personality and gift of phrasemaking, combined with his ability to clarify and dramatize the conditions and land needs of his area, have done much to oust cotton as king and

to bring about erosion control and diversification. He helped to popularize the agricultural use of kudzu and other legumes in the South, and to open up new opportunities for prosperous conservation farming.

Another Soil Conservation Service employee to receive a Superior Service Award was Dr. Atlee L. Hafenrichter, chief of the regional nursery division, with headquarters at Portland, Oreg. Hafenrichter was cited "For service to agriculture and rural life through assembling, testing, and developing large numbers of plants adaptable to inter-mountain and Pacific coast agriculture. His work is recognized as outstanding in this country, and his methods are also being practiced in several foreign countries, particularly in China and South America. Under his direction, many plant accessions from local and foreign sources have been observed, analyzed, and put to work as protective cover for the land and as new sources of cash income to the farmer.

Arthur J. Johnson, general mechanic with the Soil Conservation Service at San Fernando, Calif., was presented by Secretary Anderson with a Superior Service Award "For initiative, industry, and ingenuity in developing new methods and equipment adaptable to soil conservation practices." Many ingenious devices emerged from the imaginative mind and skilled hands of Johnson, from which all agriculture is benefiting today. Among them was an elevator device for cleaning and handling many different seeds; his innova-

tions were of such practical importance as to be adopted by large seed producers in Washington, Oregon, and Idaho. Among his numerous innovations are a "compensating shaker" type of seed scalper, a portable seed processor, and binder reels for harvesting such crops as California needlegrass.

A unit award (presented at a later date at the local headquarters) gave recognition to the Tulia, Tex., Work Unit of the Soil Conservation Service "For outstanding accomplishments in applying soil conservation practices and exceeding accomplishment goals for the year 1946."

In setting accomplishment goals for 1946, Chief Bennett asked that 1945's record be doubled. The Tulia Work Unit not only met this challenge but more than tripled the State average in combined acreage treatment. This performance resulted from improved work methods, organization of working time, scheduling activities in advance, use of the group approach, employment of effective training methods, encouragement of cooperator

participation in all features of the program, and stimulation of loyalty, high morale and team work among the personnel of the unit.

Wrote Secretary Anderson in connection with this first annual ceremony of the kind: "The high quality and specialized competence of Department of Agriculture employees is traditional * * *. Our employees have over the years developed a great pool of useful knowledge in the field of agricultural science * * *. Today, following a pattern developed in this Department, we are attempting in some small measure to honor those who have signally contributed to the Department's objectives of improving American farm life and serving the Nation as a whole. We are acutely aware that others, quite as deserving of awards * * * have not yet come to light. We hope that today's ceremony will help us to find and reward them and will also act as a stimulus and inspiration to even greater achievement and more faithful service on the part of every employee * * *."

THEY LOOKED AT THE LAND FROM A PLANE

By E. V. JOTTER and S. C. HARTMAN

AN AIR TOUR was the novel means used by the Guernsey Soil Conservation District to familiarize selected high-school students and key citizens with the present conditions of the community's most vital natural resource—the soil.

"Most effective" was the way the program was evaluated by Dwight Moore, Cambridge, Ohio, district chairman.

In addition to the educational motive, the district supervisors desired to bring out the fact that everyone can do something about the land. Accordingly, representative citizens were given rides as guests of the district over a carefully planned route. Guests included representatives from every high school in the county, and from New Concord High and the neighboring Muskingum College, school faculty members, public officials, rural and urban ministers, chamber of commerce, the press, the Ohio Division of Conservation and Natural Resources, the Grange and Farm Bureau and other rural and urban groups. Others were encouraged

to take the tour for a moderate fee and to receive all other advantages of the guests.

The district supervisors have the ultimate purpose in mind of making the development of farm plans an easier task for SCS technicians, and enabling them to devote maximum time to actual farm planning and as little as possible to explaining the advantages and the fundamental principles of soil conservation.

The tour was routed over farms on which the various conservation measures were being carried out, the farms being identified by numerals marked in lime. The fields on these farms were easily identified by the dark green foliage. The old cropping pattern of square fields contrasted sharply with the modern strips. The varied patterns on strip cropped fields reflected the differences in field topography, since the strips were tailored to the land. Other farms included in the tour showed the need for soil conservation measures.

The pilots who flew the passengers had much to do with the success of the tour. They had been lectured previously, flown over the tour, and had their attention called to the significance of what

NOTE.—The authors are forester and district conservationist, respectively, Soil Conservation Service, Cambridge, Ohio.



Kneeling, left to right: Donald Spencer, treasurer, district board of supervisors; P. W. Griffiths, Congressman; Mayor Ross, of Cambridge, and Walter Springer, secretary of the Cambridge Chamber of Commerce. Standing: Dwight Moore, chairman, district supervisors; Ray Finley, secretary; Paul Watson, vice chairman; and Fred Gunn, equipment supervisor.

lay below. Numerous passengers commented favorably on the usefulness of this schooling.

All who took the flight were briefed in advance as to what was to be seen. Each person was also given a mimeographed guide which included a map of the area covered.

Information concerning the farms observed, together with other educational material to stimulate interest and thought, was applied. The social and economic significance, as reflected in the welfare of the community and State, were emphasized.

The erosion problem, stated briefly, is that the average soil loss from the district has approximated 2 million tons per year for the past 100 years. Were the loss reduced to the rate from the Seneca Lake area the loss for the district would run around half a million tons per year. Loss for the district as a whole is much greater than that, being estimated at something over 1 million tons per year.

The Guernsey District has within it approximately 2,000 farms with an average of 135 acres.

Several hundred farms have small acreages, too small for economic units, many of them country homes.

To date, 210 farmers have developed complete soil conservation plans. The plans call for 3,500 acres of strip cropping and improved rotations, 7,000 acres of pasture improvement, 4,200 acres of woodland improvement—to mention a few common practices.

A feature of the program was a talk by Congressman P. W. Griffiths. The Congressman took the tour, accompanied by Chairman Moore and the local farm planner, George W. Eikenberry. District supervisors had the opportunity to present their distinguished guest an outline of their program and some of the problems encountered, as well as their idea of what is needed for the proper development of the local and National soil conservation program.

Chairman Moore holds that such a program cannot be successful without full community cooperation. "The success of the tour far exceeded

my most optimistic expectation," he says. The explanation is that everyone cooperated wholeheartedly. In planning the program I first went to Walter Springer, secretary of the Cambridge Chamber of Commerce. That was some 6 months in advance. He worked out a committee and obtained the cooperation of various groups. Assisting greatly were Robert Amos, editor of the *Jeffersonian*, and Mrs. E. L. Grossman, representing out-of-town newspapers. Others cooperating included the county agricultural agent, the AAA, the Ohio Division of Conservation, press, radio, Grange, Farm Bureau, service clubs, schools, churches, equipment and feed dealers, milk processors, and many other rural and urban groups.

Not the least important members of the team were the Cambridge and Lore City Airports, and the Cambridge Flying Club. Ohio University, with Ralph Smeck as director of aviation, furnished a four-place Stinson plane. Kenyon College, with Robert Morgan, a Cambridge boy, director of aviation, furnished a two-place Cub Trainer. The Ohio Flying Farmers Club was

represented by Cliff Coffman, past president, with a two-place Aronca-Chief.

Comments from those who took the rides were varied. "We surely had the best pilot to explain the tour," was said of several different pilots. "Very interesting and stimulating * * * We wish you well in your program of conserving one of God's richest blessings to man, 'the good earth,'" came from the Ministerial Association. An editor, "More has been achieved in the way of conservation than I had realized." A representative of a soil conservation district, "I'm amazed at the stupendous job yet to be done." An educational expert, "Very important. It presented a rare opportunity to view our agricultural resources." A high-school student, "The group certainly appreciated the trip, which showed the results of erosion and how improved farming will combat it. All the students had a lesson which will affect their entire future." Several executives made the statement, "The plane has been used to advantage in presenting soil conservation. I see where we can study our job better and quicker by its use."

A KANSAN TALKS ABOUT GRASS.—Tuesday afternoon we let us'-ns down on a 20-foot rope to the bottom of the 30-foot ravine in our pasture and put our gray mare, Freda, out of her misery. Sometime after 5 p. m. Monday she fell into the chasm and injured herself internally and lay unconscious in the pool of bloody water. We got lots of practice in camp at various methods of killing but we still hate to kill even a horse for mercy. We didn't really kill the mare. The farmers who tilled the soil round-about in the days gone by, taking great pride in their straight rows which ran the length of an 80, really did it. Even in the span of our short life that ditch was just a small depression for half its length.

Straight rows, destruction of grass and topsoil, are leaving our fertile Doniphan County open to destruction through erosion. Even though the demand for grain is great today, much more of our land should go back to grass—and the remainder with proper rotation and water control, could still supply the need. Our fellow Kansan, the late John J. Ingalls, puts it in a nutshell and here are pieces of the shell: "Next in importance to the divine profusion of water, light, and air, those three physical facts which render existence possible, may be reckoned the universal beneficence of grass." Grass is the forgiveness of nature—her constant benediction. Fields trampled with battle, saturated with blood, torn with ruts of cannon, grow green again with grass, and carnage is forgotten. Streets abandoned by traffic become grass-grown, like rural lanes, and are obliterated. Forests decay, harvests perish, flowers vanish, but grass is immortal. It invades the solitudes of deserts, climbs the inaccessible slopes and pinnacles of mountains, and modifies the history, character, and destiny of nations. It yields no fruit in earth or air, yet should its harvest fail for a single year, famine would depopulate the world." Said the psalmist of old: "The Lord is my shepherd, I shall not want. He maketh me to lie down in green pastures, He leadeth me beside still waters." There are

those who expect the streets of heaven to be paved with gold. Perhaps the Great Conservationist has chosen grass, the peaceful covering of parks and cemeteries to carpet our place of eternal rest.—Ralph Brazelton, in *Kansas Chief*, Troy, Kans.

WILDLIFE ON FARMS.—The following statement is taken from the latest annual report of the Pittman-Robertson program, through which Federal aid is made available for wildlife restoration:

"The establishment of wildlife areas on farms and ranches was undertaken by 14 States in cooperation with the landowners, soil conservation districts, and other conservation organizations. The improvements included fencing, posting, tree and shrub plantings, food patch seedings, feeding shelters, and water improvements. Watering devices have proven to be of great value to desert wildlife in California and Arizona. Five of the South-eastern states continued lespedeza seed and seedling distribution by which 11,509 pounds of bicolor, 21,125 pounds of sericea, and 1,102,750 bicolor seedlings were planted."

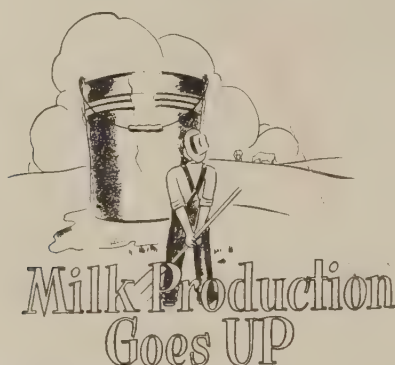
HIS GARDEN WAS THIRSTY.—John Heebink, who farms south of Souris, N. Dak., reports excellent results from irrigating his garden from a dugout constructed 4 years ago. Last summer was the first time he really needed to irrigate his garden since the dugout was made.

Heebink says: "This dugout furnished sufficient water for my garden, and we had the best garden of anyone in my vicinity. We not only had plenty of vegetables for our own use, but a surplus that our neighbors used. As the dugout is located close to the garden spot, I used 75 feet of three-quarter-inch garden hose and 40 feet of one-and-one-quarter pipe to reach the garden area. The pump has a capacity of 1,200 gallons per hour, and I used the

tractor for power. I watered the garden once a week during the dry spring and early summer but really gave it a good soaking each time.

"My dugout catches the spring run-off from the snow banks in the tree belt, but is not deep enough, I am afraid, for all conditions, so I am planning on having the Turtle Mountain Soil Conservation District deepen it for me either with a dragline or by blasting, in order to increase the storage capacity."

John Heebink is a cooperator with the Turtle Mountain Soil Conservation District and follows a complete farm conservation plan.



PASTURE PROGRAM PUSHED.—"It is in this economical production of an abundance of feed that my conservation practices have been most beneficial," writes C. B. Parr, Newberry, S. C. "The practices include the terracing of my entire farm and making the proper vegetated outlets. I have improved 25 acres of permanent pasture, 8 acres of kudzu is in production for grazing, and I have established 12 acres of sericea lespedeza which I use for both hay and grazing and 3 acres of alfalfa for hay. All of these have materially increased, economically, the production of milk from my herd. With the assistance of district personnel I am trying out two new crops which seem to be adapted to my farm and which will further affect the economy of my farm. Of these, the narrow leaf Bahia grass seems to offer good prospects on droughty areas of my permanent pasture, and rescue grass for economical use as a winter and early spring temporary grazing crop.

"Last summer I built a 5-acre farm pond which I plan to use as a watering pond for my stock and am also stocking and will manage it for fish production.

"My only regret is that this conservation work didn't start years ago."

SPUD YIELD ZOOMS.—Andy Floy, farmer of Pine Bluffs, Wyo., reports: "When I was dry farming one good rain would have meant \$12,000 to me, but it didn't rain. That is the reason I drilled an irrigation well."

With the help of technicians assigned to the Southeastern Laramie County Soil Conservation District, Floy constructed a 375-foot dike and spent a day and a half leveling land with heavy equipment supplied by the district, and laid out a carefully planned irrigation system.

This work, which cost him \$175, enabled Floy to irrigate 65 acres of potatoes which yielded over 20,000 bushels of certified seed. The potatoes he could not reach with irrigation water yielded approximately 50 bushels per acre.

Floy's complete farm plan includes three other irrigation wells and 3 miles of shelterbelt plantings. A windbreak for the farmstead is provided.

As the soil is sandy loam and subject to wind erosion, the shelterbelt runs on the north and west sides of each 40 acres of irrigated land.

"With all my wells drilled and the irrigation systems laid out and crop rotations well on the way to being established, I'll be able to produce enough crops under irrigation to retire what land I cannot irrigate to crested wheat grass."

GRASSES and LEGUMES TESTED

(Continued from page 161)

various legumes in mixtures with Wilmington Bahia and with weeping love grass. This incomplete list illustrates something of the scope of the observational seedings that are being made.

All species will be grazed by cattle. In most instances, several different mixtures will be included in the same pasture so that the choice of animals will be observed.

The Dalton project was chosen because of the large acreage of pastures already developed in which grass and clover mixtures were seeded on the lowland and sericea was sown on the upland portion of each pasture. These extensive acreages of sericea are available for overseeding with different grasses and annual winter legumes. A large acreage of kudzu also was planted at Dalton and is available for different types of overseeding.

Observational plantings will be extended to other projects as seems desirable and as seed is available. The extent to which cattle grazed Wilmington Bahia grass at Greensboro suggested that it might be more palatable than Pensacola. Additional portions of the pasture in which the first Wilmington Bahia seeding was made were sown to Wilmington, and other acres to Pensacola Bahia, in the fall of 1947. The grazing of cattle on the two grasses will be observed.

Technicians of the research and operations divisions of the Service will be encouraged to visit the projects for study and observations of the different seedings. We also plan to advise State agricultural experiment station workers of the whereabouts of the different projects and invite them to visit and study any plantings that may interest them. We believe that in this way we can make these plantings of maximum usefulness.

We want to emphasize that this is not a research project. It is simply an expansion of observational studies that are started in regional nurseries. Our primary objective is to get more knowledge of the possibilities, both desirable and undesirable, of new species before they are taken from our nurseries to private land. We hope through these observational plantings to give Service personnel and representatives of other agencies an opportunity to know more about our nursery program.



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WELLINGTON BRINK

Editor

Art Work by

W. HOWARD MARTIN

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WEEKLY REVIEW.—A unique service to the community is being performed by the Pilot Point National Bank, Pilot Point, Tex., through the use of purchased newspaper space for a weekly review of activities on nearby farms and ranches cooperating with the Denton-Wise Soil Conservation District. Publisher W. B. Crossley of the Pilot Point Post-Signal directs attention to a three-column display presentation of the week's conservation story supplied by the local work unit and sponsored by the bank. The summary appears under the heading "On Local Farms."

HE LEVELED.—Leveling of 5 acres of land on his 23-acre farm near Espanola, N. Mex., has reduced irrigating time by three-fourths, is giving 10 times better utilization of water, and promises to double the crop yield, according to W. H. Law, of the Pojoaque Soil Conservation District.

"Water penetration was so favorable that it took the field 5 days to get dry enough to plow when before leveling it required only 2 days to dry out," Law said. "Before leveling, the irrigation of this field was a real job. I had to dig, shovel, turn my water, and continue this all day long. Since Soil Conservation Service engineers gave me technical assistance irrigation is simple, and I plan to put all of my 23 acres in this condition."

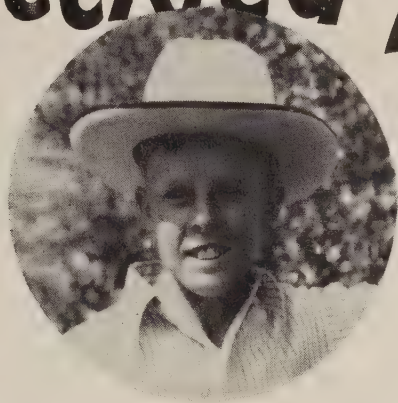
FRONT COVER.—This view of the up-and-coming farm of J. W. Gaston, Spartanburg County, S. C., shows strip rotation of cotton and small grain. The small grain is followed by an annual lespedeza. Width of strips: one terrace interval. Soil: Cecil. Photographer: Orin S. Welch.



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When our "Freckled Nose" Grows up

By PAUL T. GILBERT



IT WAS SPECK they called him, and rightly so, as his freckles gleamed abundantly through his tears while teacher disciplined him before the entire class. Speck was late again and his sins hung heavy upon him as he faced disgrace repeatedly in the little rural classroom. His embarrassment accentuated the fact that Speck was not a bad boy, but the adjectives pounded about him, "incorrigible, listless, lazy, uninterested, a dreamer." He knew the lines by heart and took the teacher's onslaught in apparent, silent indifference.

"Why was he late?" Gosh, he didn't know. Mother had got him off early enough. But there was no use tryin' to explain to the teacher or to mother that he just had to stop and watch the strange way that Mr. Jordan was ploughing his field, around the hills instead of over them the way Speck's dad had always done. Then, of course, he just had to stop to chase the big bob-white and her little ones into the brush so that the angry, darting hawk up above wouldn't get 'em. Besides, some big fish was jumpin', in Mr. Jones' pond, and Speck just had to catch a grasshopper and see if the lunker would jump again.

Like all things good and bad, the discipline finally ended. Speck trudged disheartedly back to his seat, where he slipped off into immediate deep mental debate as to whether the long-legged bird on Mr. Jordan's marsh swallowed the green frogs head first or feet first.

Speck was not too different from many lads his age, yet he was definitely a problem, not because of any malicious tendencies but because he just

didn't seem to care. Speck did have his own interests, however. His interests were wrapped around all that lived in the out-of-doors in the neighborhood of his father's farm. He loved the feel and smell of fresh-ploughed soil; the cool rain as it ran down the yellow curls to his forehead. And how he loved to try to decipher nature's little mysteries he found before him!

However, teacher did not recognize or realize the many ways that she might capitalize on these interests, developing them finally into a stage where they would be directed into other related channels. For example, had the teacher capitalized upon Speck's interest in Mr. Jones' contour ploughing she could have gained Speck's interest and admiration by developing a small study project on such land use procedures, their benefits and possibilities, finally diverting this interest into how other countries cared for their land and, before Speck realized, he might actually enjoy his lessons in geography.

A similar attack through the channels of the wildlife on the farm, compared with that of other lands, might be in order. The biology of relationships could well be wrapped around Speck's knowledge, self developed, of the animals he had found as friends along Mr. Jordan's pond or on his father's farm, until Speck himself would be asking questions calling for additional knowledge in related fields in which he had thought there was little of interest.

But how was Speck to be expected to analyze his interests in such terms of related endeavors without guidance from the educated mind of his teacher? Or is it just possible, that the teacher's

NOTE.—The author is executive secretary, Nebraska Game, Forestation and Parks Commission, Lincoln, Nebr.



Grown-ups must capitalize on children's natural interests, "developing them finally to a stage where they would be directed into other related channels."

mind was not educated in the necessary categories to capitalize on Speck's interest in contouring, farm ponds and wildlife in general? Speck's teacher was undoubtedly one of those unfortunates who had been schooled profusely in how to teach, at the sacrifice of what to teach.

True, more progressive schools are teaching conservation in all of its related categories but chiefly in the specialized, advanced agricultural courses. This is most desirable. However, it will be the local school teacher, and not the specialists in various State and Federal agencies, who will finally accomplish the conservation sales campaign to the youth of America. This will not be accomplished until the pedagogues realize the fundamental need for teaching all Americans the value of saving our soil, water, and other natural resources, chiefly by doing something about it.

The placement of blame for this neglect has no place in a sound, constructive planning program. Certainly, remedial measures will arise only through the integration of ideas between competent educators in our various teacher-training institutions and other individuals specialized in the knowledge of sound conservation procedures pertinent to our natural resources.

Speck and his pals care little whose responsibility is foremost in such an endeavor. They only know that they love the out-of-doors and all connected with it. They would worship at the shrine of any who could answer the questions so vital to themselves; and who could capitalize on this interest any better than the classroom teacher?

Assuming that a pedagogical Utopia may sometime exist with rural teachers familiar with the story behind grassed waterways, farm ponds, con-

tour farming, shelterbelts, wildlife habitat development and similar subjects, what will be the aids that will be available for demonstration work, and specialized assistance? The field of such material is unlimited and the cooperating agencies numerous. In fact, many such agencies are well in advance of the average teacher's capacity to use such materials, due to inadequate previous training in such categories.

In Nebraska, a coordinated program is being developed with definite success. Conservation camps, field demonstrations, and school programs built around rural interests are being developed through the cooperation of the Soil Conservation Service, the 4-H Clubs, the Future Farmers of America, the county agents and the Game, Forestation and Parks Commission. Such topics as "Farms for Keeps," "Good Farm Management is Good Game Management," "Developing Homes for Wildlife," and similar programs on soils, farm methods, fish, fur, game birds, and animals are frequently presented along with the learning of skills pertinent to hunting and fishing. These

programs presented by specialists in these various fields are most successful. But they are the exception in any given area rather than the rule, due to the large State area to be covered. Their value would be substantially increased if they were the end product to a continued unit program in a rural school, rather than merely a one-shot inoculation. A poignant part related to this continued conservation school program is the fact that Speck, and others like him, can unquestionably sell the program faster to his farmer father than could any field man of any agency.

Adult conservation education is progressing with greater velocity than the youth program. However, many virgin fields still remain unstimulated. Sound conservation programs for adult participation are numerous but in no sense proportionate to the demands. The reason for this is apparent: Lack of funds and personnel in various related agencies, accentuated in some cases by complete absence of policy promulgating public relations.

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Speck and his pals love the out-of-doors and all connected with it. They would worship at the shrine of any who could answer their questions. Who could capitalize on this interest any better than the classroom teacher?

SOIL, SOWERS

and the Church



By REV. RAY F. MAGNUSON

"A good man leaveth an inheritance to his children's children"
(Proverbs 13: 22).

THE CREATOR seems to be a very patient and long-suffering teacher. We are so slow to catch on. And in no area have we been slower to catch on than in this problem of the earth, its soil, and man's proper relation to it. As one sees the devastation caused by man's ignorance and folly in his wasteful misuse of soil and forest, he is reminded of the story which Brooks Hays from Arkansas tells. An old back-store philosopher was asked if he believed in the total depravity of man. "Believe it?" he asked, as with expert aim a squid of tobacco juice hit the nearby sawdust box, "Why, I have saw it!"

Whatever may be one's view of the theology of man's inherent condition, one dares to say with some assurance that in this problem of soil and its use, theology does enter. When General MacArthur, at the time of the surrender agreement with Japan, said that world peace and reconstruction was a theological matter, he was giving expression to a truth that has wide application. He might well have said that every human problem has a theological nexus.

However, there is theology *and* *theology*. There is nothing so bad as a bad theology. For example, it is strange indeed how a few verses in Genesis have been stretched into a theory that the earth and everything upon it bears the taint of a God-

imposed curse. Granted that the theory does have an element of logic when applied to man, surely as we think of the earth and the plant and animal life upon it, we cannot share the pessimistic and darkened outlook of those, who, like the animistic nature worshippers of primitive tribes, find demon-like forces in control of nature. The intricate patterns of snowflakes; the tall symmetry of pine trees; the shades of color in rocks and flowers and rainbows; not to mention such modern miracles as radio and atomic energy and penicillin; all these earthly things suggest the deeper truth that the earth is full of the glory of God.

"This is my Father's world,
I rest me in the thought,
Of rocks and trees, of skies and seas,
His hand the wonders wrought."

We are either obstinate or woefully blind if we cannot sense this more basic theological assumption—the more Biblical one, if you please—that the earth is the Lord's. With much more evidence than can be mustered by the back-store sage, the man who walks with eyes of faith can say, "I have saw it." Whether he reads from the open pages of nature itself, or from the Book of the Ages, matters very little. The answer is the same. As one reads the Genesis story of the Creation, he comes to the end of that great drama where it reaches its sublime conclusion in the words, "And God looked upon the earth and saw

NOTE.—The author is secretary of town and country work, Nebraska Annual Conference of the Methodist Church, Nebraska Wesleyan University, Lincoln, Nebr.

that it was very good." The author of that great drama was not writing tragedy. The ending was a hallelujah chorus in which the stars sang together, and the trees on the hills clapped their hands for joy.

All of which provides support for the first proposition we would venture to set forth in this discussion of soul and sowers. *The soil is not evil*; it is sacred, for God made it. Liberty Hyde Bailey is theologically correct when he speaks of the holy earth. It is God's priceless gift to man, whom He has created to be a steward of its treasures, and to pass on its inherent richness to oncoming generations.

If we accept this basic proposition, it means that the problem of soil conservation is brought into a new orbit of consideration. For it is seen for what it really is—a moral and religious issue. Bluntly speaking, it means that he who misuses the earth or wastes its treasures is *guilty of sin*.

He has sinned against God and against his fellow-men. He has betrayed his stewardship. He has broken the commandments, one of which states specifically that one shall not steal. They who destroy the fertility of the soil rob future generations of their rightful heritage.

There is a second proposition that offers the Church a strong apologetic for becoming directly involved in the soil conservation program. It is the theological principle that *whatever affects the welfare of people is always a major concern of a high religion*. There is a type of religion which construes salvation in very narrow terms. To adherents of this group, salvation is *salvage*. It is a religion of escape only. Like the fakirs of India, this group minimizes the efforts that are made to make this world more habitable for Christian living. But a high religion, while not for a moment relinquishing its interest and concern for the life that follows this earthly existence, is greatly concerned about life here and now. It construes



"If my land cry against me, or that the furrows likewise thereof complain; let thistle grow instead of wheat, and cockle instead of barley" (Job 31: 38, 40).

the Kingdom dream of Jesus to be an idea which must have its beginning in this life.

Even superficial study of the facts shows that soil has a most direct relationship to the welfare of people. For example, it affects their health. It was not until I began to read some of the current literature dealing with soil fertility and its relation to mineral and vitamin content of vegetables, that I realized that lettuce is not lettuce, nor are potatoes merely potatoes. Bad teeth and various diseases caused in part by malnutrition can be traced to poor soil. Of course, poor soil means poor crops, which means low income, which means insufficient money to have adequate medical care, which means, again, bad health. Directly and indirectly, soil makes the difference between good health and bad health. It is a poor kind of religion which will not take cognizance of this state of affairs and in the name of a good and loving Father, attempt to do something about it.

The ramifications of what poor soil can do to people are so many that it would be utterly impossible within the compass of this article to explore them. Sufficient to say, the Church, in the name of the God it proclaims and the principles it espouses, cannot do other than lend its influence to the best solution of the problem. But there is a third reason why the Church is concerned. *Unless the soil is saved, the Church itself as an institution is threatened, particularly in rural communities.* Dr. T. S. Buie, regional conservator, Soil Conservation Service, Spartansburg, S. C., has made some very interesting studies of the relationship of soil to churches. His conclusions are what might be expected; namely, that in areas of high soil fertility, the rural churches are in a flourishing condition both in terms of attendance and in finances as compared with rural churches in areas that have been greatly eroded. Comparing church with church, the ratio in favor of the former is at least two and one-half to one. And this does not tell the whole story. In one instance, there is hope for the future, in the other instance the Church is a dying institution.

The question, perhaps the \$64 question, is "will the Church, with its potential power for influencing people, mobilize its strength sufficiently and in time to aid materially in this Nation-wide struggle to save its basic resource?" Frankly, we are not sure. Up to the present moment, the Church has been pretty much asleep so far as any serious attempt is made to provide sufficient motivation

and organization for the task. But there are encouraging signs that an awakening is at hand. More and more, the major denominations are giving encouragement to rural pastors and laymen by calling conferences dealing with this and kindred topics on rural life in the hope that these leaders will not only be able to provide religious motivations for this crusade through sermons and teaching, but will in many instances directly relate themselves to programs on soil conservation by serving on committees and by making their churches the headquarters for community meetings dealing with the subject.

Obviously, the technical leadership of the soil conservation movement will and should remain in the hands of skilled conservationists. Most pastors have neither the time nor the training to become experts in this field. But this should not inhibit them from seeding as much direct association with the movement as their schedule will permit. Moreover, there is no reason why the average pastor could not familiarize himself with most of the technical phases of the problem. By so doing, he will be in a much better position to understand the moral and spiritual aspects involved.

This article, of course, is written from the standpoint of one who has recently completed 18 years in three rural pastorates. It is to be expected that what is here written will reflect something of a bias that years of ministerial activity have a way of bringing about. It would therefore be presumptuous to suggest to Soil Conservation Service people, boards of supervisors of soil conservation districts and others, how to accomplish their tasks. And yet, we who are in the Church as pastors (and sometimes as laymen) with some temerity would say that one reason why more of us are not in this great struggle to save America's soil is *because we have not been asked to help*. At least the recruitment has not been too persistently carried on.

We country preachers, being human, are quite susceptible to intelligent and friendly persuasion. Most of us are in the crusading business by choice. And if conservationists would help us to see our tasks in relation to this great problem and would appeal to us, not from the standpoint of that which is merely mercenary but from larger, unselfish considerations, they might be surprised at our eagerness to respond. Not all of us, of course. But hundreds of us would. Most preachers are gun-shy of programs that are saturated in a cer-

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CROP RESIDUES SERVE TWO FARMERS WELL

By C. WALLACE BUCK

EXPERIMENTS have been conducted at various experiment stations over the country on the value of crop residues for protecting land from both wind and water erosion.

I want to tell you in this article about the experiences of two farmers in northeastern Nebraska in the preparation of seed beds, the planting of crops, and the cultivation of row crops on land protected by a cover of crop residue.

Northeastern Nebraska is in the loess hill region. The topography runs from gently to steeply rolling. Predominant slopes are from 8 to 15 per cent. Soils vary from silt loams to silty clay loams. The average annual precipitation is from 25 to 30 inches, with occasional rains of high intensity.

Grain crops in this area are chiefly corn, oats, barley, and wheat. Soil building and hay crops are alfalfa, red clover, sweet clover, and brome grass, either singly or in mixtures.

Interest in the use of crop residues to control water erosion started in northeastern Nebraska upon publication of the results of research conducted by Dr. F. L. Duley, of the Soil Conservation Service, and J. C. Russell, cooperative agent, University of Nebraska.

The adaptation of this research to practical use has produced a number of problems especially in connection with the securing of suitable equipment to till the soil and leave crop residue on the surface. However, some farmers have developed ways of doing a commendable job with only a minimum amount of specialized farming equipment.

Albert Watson, a farmer living 3 miles north of Wayne, Nebr., is completing his fourth year of cultivating his 240-acre hilly farm under a protective cover of crop residue. His crop rotation consists of corn, oats with red clover, corn; one field of red clover is left standing over each year for hay and seed. Red clover is planted with all spring small grain. The small grain is combined, leaving the straw scattered over the field. The fol-

lowing spring, after the red clover has grown to a height of 6 to 8 inches, the land is subsurface tilled with a 7-foot tool-bar machine having three 30-inch sweeps. The first tillage operation is made shallow, from 2½ to 3 inches in depth, to cut the clover roots. A disk or rotary hoe run backwards is then used to tear out the clover and stop its growth. The land is subtilled again before planting at a depth of 4 to 6 inches. Planting is done with a hard ground 2-row lister at a depth of 3 to 4 inches and the land harrowed immediately. This harrowing operation pulls the residue back to the surface and stabilizes the contour ridges. The land is harrowed once more after the corn appears, and then cultivated two or three times with a regular tractor cultivator equipped with sweeps rather than the conventional shovels. Watson tried using a planter with a stub-runner and furrow-opener, like the type used in the experimental work at Lincoln, but prefers using the lister as he thinks it is easier to control weeds by this method. An observation of his corn fields indicates that he has controlled weeds and maintained a protective residue cover throughout the growing season.

Second-year red clover land is always planted to corn and is handled the same as stubble land, with the exception that only one subsurface tillage operation is necessary.

Land for small grain is prepared by disking the cornstalks and drilling in the oats and red clover.

In 1946 Watson prepared a 12-year-old alfalfa field for corn by subsurface tilling and double disking, then following the same method of planting and cultivation as on his stubble land. This field of corn yielded 52 bushels to the acre in a dry season while plowed alfalfa land in the same community yielded 10 to 15 bushels per acre.

All tillage operations on the Watson farm are performed on the contour. In addition, the land is protected by double spaced drainage type terraces with an adequate water disposal system. Before embarking on a stubble mulch tillage program, there was considerable interterrace erosion and silting in the terrace channels. Now there is very little noticeable erosion and the terrace chan-

NOTE.—The author is district conservationist, Soil Conservation Service, Wayne, Nebr.

nels are practically silt free. Watson considers his terraces as safety valves in the advent of severe rain storms.

Watson finds that soil protected by residue cover never bakes or gets hard following rains and that it stays moist much longer than unprotected soil. The only use being made of the moldboard plow is in the plowing of brome grass used in rotations. Some experimenting has been done in handling grass without plowing, but as yet, no successful method has been found.

Crop yields on the Watson farm have been well above county averages. There is not much difference under favorable moisture conditions, but during dry seasons the advantage of stubble-mulch tillage over the commonly practiced clean-tillage method is outstanding.

Albert Sibbernson owns and operates 800 acres of steeply rolling land 15 miles northwest of Omaha, Nebr. He became interested in the use of crop residues as an erosion control measure in 1939 and purchased one of the first subsurface tillage machines in this area. Since then, every effort has been made to keep as much residue as possible on the surface of the land.

Crop rotations followed on the Sibbernson farm are as follows: (1) 2 years of corn, oats with sweetclover, sweetclover, wheat; (2) 2 years corn, oats with red or sweetclover and back to corn. From 125 to 150 acres of cropland is kept in alfalfa. This alfalfa is allowed to stand for 3 to 4 years before breaking out and planting to corn.

In preparing land for corn following small grain, Sibbernson subtils the stubble in the fall, using a tool-bar machine with three 30-inch sweeps at a depth of 3 to 4 inches. The land is subsurface tilled again in the spring at a depth of 4 to 5 inches. The corn is then planted with a two-row surface planter equipped with stub-runners and furrow-openers. A rotary hoe is used for the first two cultivations, followed by one cultivation with a regular tractor cultivator equipped with sweeps instead of the conventional shovels.

When corn follows corn, Sibbernson first uses a stalk cutter to cut the stalks from the previous crop. This, he says, must be done when the stalks are dry. He follows this operation with the rotary hoe to break the stalks further and distribute the fragments more evenly. He then subtils the land and planting and cultivation are the same as described for corn following small grain.

Stubble land to be planted to wheat in the fall is subsurface tilled at a depth of 3 to 4 inches just as soon as the grain is harvested. It is subsurface tilled again just before planting and the wheat sown with a regular grain drill.

Second year sweetclover is usually followed by wheat. The clover is mowed in June. After the clover dries, a one-way disk is used, running the disk shallow to cut up the clover and partly cover the residues and start its decomposition. This field is subsurface tilled before wheat planting and the wheat sown with a grain drill.

Sibbernson plows all the alfalfa land on his farm before returning to grain crops.

On the Sibbernson farm, as on the Watson farm, all tillage operations are performed on the contour and the land terraced with grassed waterways. Originally Sibbernson tried to cope with the erosion problem without terraces. The crop residues on the land protected it against ordinary rains, but heavy downpours caused gully erosion. This convinced him that terraces were needed. One field on which terraces were constructed in 1935 required maintenance for the first time in 1947. They had been protected continually by residue cover.

To show the effectiveness of residue cover in preventing run-off, Sibbernson shows visitors a valley entered by two drainageways serving land areas of equal size, one from his land and one from a neighbor's where the watershed is unprotected. The heavy spring rains this past season failed to reach the floor of a light plank bridge over the drainageway from Sibbernson's land while a like bridge over the drainageway from the neighboring land flooded over on several occasions.

Like Watson, Sibbernson has noticed little advantage to crop yields under favorable moisture conditions, but there is a marked difference in favor of stubble-mulch tillage during dry seasons. Both men claim that preparing the land for planting by use of the subsurface tillage machine is cheaper than using the moldboard plow. They both point out that their land is gradually increasing in fertility by the constant accumulation and maintenance of organic matter in the soil.

A number of farmers in northeastern Nebraska are using methods similar to those followed by Watson and Sibbernson, or variations of these methods, with satisfactory results. They realize that if soil fertility is to be maintained in this steeply rolling section run-off must be controlled.

Owners Seek Light on Land

By GUY C. FULLER



THE SCIENCE OF CONSERVATION farming is rapidly developing, but the practical application on the land is only beginning. The greatest obstacle to getting conservation on the land is still the lack of knowledge regarding the basic fundamentals on the part of land owners and operators.

The results of a recent experience is sufficiently encouraging to substantiate this conclusion.

The Stronghurst Booster Club, a wide-awake organization, in the village of Stronghurst, Ill., conceived the idea of scheduling a series of four meetings for the purpose of acquainting local people, especially city and village land owners, with the organization and operation of the local soil conservation district. They did not want a series of general meetings but something regarding the facts of the program.

A committee was appointed to work out the details. Soil Conservation Service technicians were requested to present the facts and lead the discussion. The dates and place for the meetings was arranged, as well as publicity procedures. A social period at the close of each meeting was announced, at which time coffee and doughnuts were served.

While the committee was completing arrangements for the meetings, the district technicians developed an interesting and informative program. To accomplish this job visual aid material was assembled, such as slides, movies, and chart material of factual data. This material was arranged in sequential order, with each phase adding to the framework of developing a farm conservation plan for a representative farm in the district.

Subject matter presented and discussed was, in general, as follows:

First meeting.—Preliminary remarks consisted of a brief statement regarding the purpose of the meetings, how the district came into being, how the district operates, introduction of directors, their duties and responsibilities, statement of policies, illustrations of local erosion conditions, a few conservation practices already adopted, the explanation of what a farm conservation plan contains and how it may be obtained.

Second meeting.—The development, interpretation, value and use to be made of a farm conservation survey map were examined.

Third meeting.—With the use of visual aids and charts, the place of each conservation practice was pointed out, as well as the comparative effectiveness of each, together with its application and maintenance. A comparison of crop rotation with yield data, fertility value, etc., was of special interest. Seeding mixtures for various purposes were emphasized.

Fourth meeting.—Because of the limited time permanent points and facts from the following subjects were discussed: A soil management program, pasture improvement, woodland, wildlife, and engineering. This fourth and last meeting ended with a summary of the essential steps and subject matter to consider in the development of a farm conservation plan based upon the capabilities of the land. The usual social period was furthered with hot coffee and doughnuts. The enthusiasm from these meetings soon spread to adjoining districts.

NOTE.—The author is district conservationist, Soil Conservation Service, Galesburg, Ill.

In the Warren County district, Monmouth, Ill., details were handled by a committee composed of a representative from the Monmouth Association of Commerce, Kiwanis, Lions, Rotary, and the local district board of directors.

In the Knox County district, Galesburg, Ill., the committee represented the senior chamber of commerce, junior chamber, cosmopolitan, Kiwanis, Rotary, Lions, Exchange, and the local district board.

The total value and accomplishments of these meetings in each district may be difficult to appraise but the following facts indicated to the sponsors that they were very much worthwhile.

1. The total attendance at each meeting increased, ranging from 75 to more than 200.

2. Applications for technical assistance in developing farm conservation plans increased in each district.

3. A higher percent of the applicants understand what they were making application for; their responsibility, as well as that of the district.

4. Revision of old conservation plans for more effective erosion control and improvement of soil management practices have resulted.

5. A better relationship between land owner and tenant has been brought about in many instances.

6. The fear of obligation and costs involved no longer exists on the part of many land owners and operators.

7. Needed conservation practices are more readily accepted by those who attended the meetings.

8. Better attendance at group planning meetings has been noted.

9. The committees have expressed a desire to sponsor a similar program in 1948.

From the standpoint of a worthy agriculture project for community improvement to be sponsored by any single or group of organizations, this type of program has many advantages, some of which are:

1. It is a program that requires very little cash.

2. It is a program that does not run for a long period of time (4 weeks in this instance).

3. It is a program of vital concern to everyone.

4. It is a program that has economic value to the individual and to the community.

5. It is a program that affords an opportunity for clarification and understanding regarding the responsibilities placed in the hands of the local people concerning soil and water conservation.

6. It is a program that makes available factual

data of a technical nature, some of which is applicable in every community and on every farm.

Should any one question the statement that "The greatest obstacle in getting conservation on the land is the lack of knowledge regarding the basic fundamentals of conservation farming on the part of land owners and operators," needs only to experience the results of similar meetings.

"FRECKLED NOSE" GROWS UP

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It is only with the unbiased unity and cooperation of all governmental and State conservation and education agencies and institutions, when completely familiar with each other's categories and related problems and possibilities, that the average farmer may become acquainted with the unified picture of sound conservation activity. More important yet, Speck and his pals may become so endowed while still attending the little country school that they will not have to wait until they reach adulthood to assimilate such conservation procedures as did their fathers. Instead, they will be so fully equipped by graduation time that such conservation procedures will be mere routine in their work of making America more productive, as well as a better place in which they can raise their offspring. A place with less problems and more interests for freckled noses such as Speck.

SOIL AND CHURCH

(Continued from page 176)

tain type of sectarianism. We just don't think that way. But appeal to us in the name of a high religion—and really mean it—and the results are apt to be surprisingly favorable. We are not willing to grind axes indiscriminately. But we are willing to grind the axe that is to be used for advancing the Lord's work. In fact, we will help swing it.

To the technician in the conservation crusade we would say that the country parsonage or manse may frequently house an ally who, with some acquaintance with the problem of soil conservation, could help turn the tide in many a community. And the Church he serves could well become an agency where powerful spiritual forces might be released actually to bring about a revival of stewardship, of which soil conservation is only one phase.

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The Tulia staff: Miss Pat Brown, E. J. Myers, John R. Crocker, Chalmers Terry, Jesse Jenkins, and Edward J. Overby (presenting the award).

TULIA OUTDOES ITSELF—FOLLOWS ONE GREAT RECORD WITH AN EVEN BETTER ONE

By PAUL H. WALSER

THE TULIA, TEX., WORK UNIT of the Soil Conservation Service, recent recipient of a USDA Superior Service Award is not content to rest on its laurels. Its 1947 record for getting conservation work done on the land is even better than its award-winning 1946 performance. Ranchmen and farmers of the Swisher County Soil Conservation District, where the Tulia office is located, are reporting sizable increases in irrigation systems, terraces, management of crop residues, cover

and soil improving crops and diversion terraces.

The Superior Service Award presentation ceremony was held in the Griffith Theater at Tulia. W. Scott Amend, district conservationist, told the 200 assembled farmers and agricultural leaders how the Tulia staff was able to win its high honor. He gave large credit to the district supervisors, Charles Herring, Victor Harman, Roy B. Bell, John R. White, and Norman Burke. "Those supervisors demonstrated their leadership by assuming the responsibility of administering the State Soil conservation law and by executing a district plan of operations," Amend said. He commended the supervisors for prompt action in the face of

NOTE.—The author is State conservationist, Soil Conservation Service, Temple, Tex.



J. T. Barnett, farmer, makes a good rodman. John R. Crocker runs the level. The picture was made as dusk came on.

emergency and cited particularly their quick appeal to local farmers to begin emergency tillage during a severe dust storm which struck early in 1947.

He also pointed to supervisor contacts with farmers and businessmen, the weekly news column carried by the Tulia Herald, the holding of an annual field tour, the promotion of conservation exhibits in local stores through the cooperation of the vocational agriculture teacher at Tulia High School, and the harvesting of native grass seeds for use in regrassing depleted range land.

He said that direct aid which farmers provided the Tulia staff in 1946 helped a lot. On numerous occasions local farmers took Soil Conservation Service technicians to the field in private cars when all staff automobiles were tied up. Farmers acted as rodmen, allowing the Service staff to split its crews and cover more ground.

The organization within the unit at Tulia itself contributed a great deal, according to Amend. "Weekly schedules were kept current. This enabled each employe to know his assignment at least 1 day in advance and to execute the assignment with little confusion or loss of time," said Amend.

He pointed out that personnel of the Soil Conservation Service staff were thoroughly trained, that high morale was maintained, that each member of the unit understood the plan of operations which the Swisher district uses, that they were able to work with whole groups of farmers in many instances, and that they were able to do a sound job of explaining to interested farmers ways of applying conservation measures.

Herring, farmer and district supervisor, told guests at the presentation ceremony of some of the work which the Tulia staff has done. He traced development of the Swisher district from a 1939 land use planning committee to its present day set-up and said the district is bringing additional income to the neighborhood from the better crops resulting from improved soil and moisture conditions.

"The goal of the district," he said, "is a complete soil conservation program on every farm." Herring said that the district now has 690 co-operating farms and 313,000 acres conservation-



Farmers helped by providing transportation when needed. Jesse Jenkins is nearest the camera. A. J. McCollum, farmer, is at the wheel of his car.

planned. The latter figure represents about 55 percent of all land in the district.

Exploring facts which have helped the Tulia work unit compile its outstanding record, he listed the low average age of local farmers, the high proportion of land owned by operators, the long-time tenancy agreements, and the high educational level. He added to that a number of items such as awareness that land in the district still is new and fertile, understanding that soil conservation measures are necessary to prevent return of dust storms, and cooperation of various local and outside agencies.

Pointing out each member of the work unit staff, Herring mentioned that Jesse Jenkins, conservationist, sold three farmers on using vetch and Austrian winter peas, a legume crop, several years back. "This year there are more than 7,000 acres of legumes in the district. The work unit is responsible," stated Herring. "Legumes pay their way with winter grazing and then they help suc-

ceeding crops. They seem to be part of the answer to our fertility problems.”

Herring in turn singled out Chalmers Terry, engineer; E. J. Myers and John R. Crocker, aides, and Miss Pat Brown, clerk. “This section has gone in for irrigation on a large scale only the past half dozen years,” he said. “Irrigation has brought erosion problems, because irrigation ditches wash when they are laid out wrong. Irrigation has made us concern ourselves with water-spreading. As late as 1940 it wasn’t uncommon for two men to spend a whole day spreading water from just one well. Now I know a man—I know several such men—who farm as much as 240 irrigated acres without help. Improved methods of water application is the reason they can do it.

“We used to see a lot of stair-stepped fields here that were irrigated.” Now Terry’s pioneering has brought longer irrigation runs, uniform application. Instead of sitting around half a day at a time chinning about how to iron out kinks in irriga-

tion systems, farmers here solve it easily. They say, “Go get Terry.”

Herring said improved irrigation has saved pumping costs, increased crop yields and reduced erosion.

He termed Myers and Crocker the “work-horses” of the Tulia staff; Miss Brown the “brains.” Stated Herring, “Our board of supervisors is very pleased with the help from the Soil Conservation Service personnel.

E. J. Overby of Washington, assistant to the Secretary of Agriculture, presented the Superior Service Award to the work unit. He pointed out that the Tulia staff was the only Service office in the Nation to get the honor.

Stated Overby, “You members of this Tulia work unit can well afford to feel a deep and lasting pride in this mark of your achievement. You members of the board of supervisors of the Swisher County soil conservation district, and all of you farmers who are partners in this enterprise, share in this pride.



Attending an appreciation dinner. Perry Bowser, farmer; R. M. Ross, assistant chief of operations, Soil Conservation Service; Edward J. Overby, assistant to the Secretary of Agriculture; Louis P. Merrill, regional conservator, Soil Conservation Service.

"That is because no such achievement would be possible unless you provided the opportunity for it. The real significance of the award lies in the extent to which it represents acceptable service performed for you.

"Viewed at long range, your part in the expansion of the soil conservation program here in the Tulia work unit is an important contribution to the national and world-wide agricultural program."

He handed the bronze medal and an embossed certificate to Jenkins. On the platform were other members of the staff.

R. M. Ross, of Washington, D. C., assistant chief of operations for the Service, told the Tulia staff farmers and ranchers, "You have set an example that will be a challenge to every other Soil Conservation Service work unit in the United States.

"The presentation of this award is symbolic of the rewarding nature of soil conservation wherever it is practiced. The rewards from conservation and wise use of the land are by no means limited to the farms and ranches on which you have assisted with the establishment of conservation programs. They extend to our whole society. Everybody profits."

Louis P. Merrill, of Fort Worth, regional conservator, stated that the soil conservation district furnishes a common denominator for neighborhood cooperation. "The soil conservation district



Sid Payne tells 'em what conservation has accomplished in Texas.

is established to enable the people to do those soil conservation jobs which need doing that the people can do for themselves," said Merrill. He said that the Soil Conservation Service is set up to do necessary soil conservation tasks which local people cannot do for themselves.

Sid Payne, a farmer, commended the work unit and the district on behalf of the Texas State Soil Conservation Board, of which he is a member.

Herring, Perry Bowser, a farmer near Tulia, and Ewell Griggs, president of the First National Bank, spoke briefly at a dinner preceding the award presentation.

Griggs, speaking on behalf of local businessmen, said, "You don't have to be half smart to know that when the farmer is helped we're all helped. We are for you because we're selfish enough to know that we're getting part of the benefits."

GRASSED WATERWAYS IN KANSAS AND NEBRASKA

By IRA K. LANDON

IN EASTERN NEBRASKA and northeastern Kansas, the annual rainfall varies from 25 to 35 inches. Storms of an intensity of 2 inches or more in 1 hour occur frequently. The dominant slopes are 5 to 10 percent, although some are much

NOTE.—The author is zone conservationist, Soil Conservation Service, Lincoln, Nebr.

steeper. Most of the soils have deep profiles. They are dominantly loessial, but some are of glacial or residual origin. The loess soils are friable and fairly fertile. Due to the intensity of rainfall and to the slopes, gullying is common in the natural water courses. The establishment of grassed waterways under these conditions is more than just an agronomic project. It involves many other sciences.

The function of a waterway is to remove excess water safely. This water may be local rainfall, terrace discharge, or foreign drainage. If the waterway is properly designed, established and maintained, the damage done by the run-off will be held to the minimum. Protection from erosion is, or should be, the primary consideration, but some return may be obtained from hay, seed, or pasture. Before undertaking the establishment of a waterway, certain facts should be ascertained. What is the acreage of the watershed? What is the slope, the soil texture, the land use, the prob-

of the seasonal variations, we may have less than this ideal situation.

Occasionally it is possible to choose between two or more sites for a waterway. This is the exception, however. Usually the slope or grade of the waterway is determined by the topography of the only available site. The slope factor can seldom be altered except for the smoothing of overfalls and other minor irregularities.

This leaves only the variation of the depth of water as a means of controlling velocity. Fortunately, this is the easiest and the cheapest of the



Strip cropping of corn with small grain in the uneven-width strips, Washington County, Nebr. Two seeded, natural drains are to be seen here.

able rainfall intensity? These data are needed to calculate the maximum rate of discharge or, in short, to figure the size of the job the waterway has to do. A waterway should be selected or designed to carry the peak flow of water for a given watershed at a safe velocity.

The velocity of water flowing in open channels is determined by:

1. The slope of the channel.
2. The depth of the water.
3. The friction between the water and the channel lining.

The friction between the water and the grass varies with the height and stiffness of the grass and the density of the stand. We always strive for a dense stand of adapted grasses but, because

three factors to manipulate in waterway construction. Decreasing the depth of flow to reduce velocity can be accomplished only by widening the channel.

Let us assume a watershed with a maximum run-off of 60 cubic feet per second. Suppose that we have a choice of two sites for the waterway. One has a slope of 10 percent and the other 7 percent.

The tables and graphs in our Engineering Handbook show that on a 10 percent slope a sod channel with 8:1 side slopes, a 21-foot bottom width and a 5-inch depth of flow would be required to carry 60 cubic feet per second at a velocity of 6 second feet. On a 7 percent slope, a channel of 11-foot bottom width with 8-inch depth of flow will discharge the same quantity of water at the same velocity. Other things being equal,



Seeded bluegrass outlet channel protected from livestock by fencing, Johnson County, Nebr. Sodded in the spring of 1937 it quickly firmed up, ready to carry water without eroding. Seed had been stripped before photo was made.

the 7 percent slope should be selected. However, sometimes other things are not equal. A hazardous discharge point or a sand pocket in the 7 percent side would make it advisable to choose the steeper slope. If so, it must be remembered that, although an 11-foot bottom width with 8-inch depth is adequate on a 7 percent slope, these same specifications are not adequate on a 10 percent slope because the steeper grade and greater depth of water would increase the velocity from 6 second-feet to more than 7 second-feet. Excessive velocity such as this may be, and frequently is, the cause of failure of vegetated waterways.

Six feet per second has been observed to be a safe velocity for brome grass in vigorous condition on silt loam soil. If, because of low fertility, vigorous growth is not maintained, or if the soil is sandy in texture, the channel should be designed for lower velocity. That means a wider and shallower cross-section. Therefore, the texture and fertility of the soil as well as the watershed acreage, slope and rainfall characteristics enter into the design of waterways.

Southern strains of brome grass (Lincoln in Nebraska or Achenbach in Kansas) mixed with

alfalfa or red clover have been recommended for vegetating waterways in this area. Failures of some grassed waterways which were of adequate hydraulic design, indicate that other grasses should be seeded in a mixture with brome grass on certain soils.

On heavy soils, in sites that are inclined to be droughty due to shallow topsoil or because of western exposure to the summer sun, western wheat grass is better adapted than brome grass and therefore it is more persistent through extended periods of deficient rainfall.

Brome grass does not make a vigorous growth on the sandy or eroded, infertile glacial or residual soils. For this reason, it is subject to rilling in the waterway channels. Some of the adapted, native, sod-forming grasses such as switch grass or big bluestem, grow more vigorously and persistently than brome grass under such conditions. Therefore, a mixture of grass species usually is desirable. Wheatgrasses are adapted with brome to heavy soils and switch grass with brome to sandier sites. Observations indicate that intermediate wheatgrass may be equal or superior to brome grass in both heavy and sandy soils.

After a site has been selected and the minimum size determined, the channel must be shaped to the calculated dimensions. Where the site has not been severely eroded and little, if any, dirt moving is required, simple plowing followed by disking, harrowing and perhaps dragging with a float or road drag will shape and compact the seedbed.

On the other extreme, where the site is badly gullied, extensive earth moving is required. This may entail the use of bulldozers, carryalls, blades or other heavy equipment. Between these two extremes are the small gullies 2 to 4 feet in depth and width that can be filled, packed and shaped with a farm tractor and plow.

Any soil placed in the gully should be firmly packed with the tractor wheels. This will prevent subsequent settling and cracking, and will lessen the likelihood of the soil being washed out before vegetation is established.

The discussion of minute details of the shape of the channels may be purely academic if the construction is done by the farmer with his own equipment and with little or no on-site assistance.

Very small flows or trickles of run-off are inclined to meander over flat-bottomed vegetated channels. This meandering may result in siltation, uneven flow and may eventually lead to erosion in the channel. On the other hand, flat-bottomed channels provide more uniform depth and velocity than parabolic or V sections under medium or heavy flow.

If heavy equipment is operated carefully, a flat-bottomed channel may be built. If, however, a truly flat-bottomed cross-section is not constructed, it is preferable to have a broad V or slightly dished, parabolic section. This is easier to achieve with ordinary farm equipment. Small flows will stay in the low center of such a channel and will not meander.

Assume, for the purpose of this discussion, that all earth moving has now been done in the construction of the designed channel. The seedbed must be prepared so as to:

1. Hold the seed while it sprouts and grows.
2. Absorb and then release water for the grass.



In background of this Nebraska feedlot picture can be noted an ideal waterway handling excess water from terraced field. Field at left in distance is terraced and planted to bromegrass.

3. Supply plant food.

A certain amount of loose soil on the seedbed is necessary to cover the seed. On the other hand, the soil underneath must be firm enough to enable the tiny grass seedlings to take root and survive. The seedbed requirement, as to tilth is, then, a firm soil with just enough loose dirt to cover the seed. This condition can be attained by the use of a disk harrow, spiketooth harrow, drag, roller, or cultipacker. Which tool should be used first is dependent on the condition of the soil but it is safe to say that the last tool should be a packer of some sort.

Grassed waterways are often located where water has naturally concentrated. Here, sheet or gully erosion has frequently removed the more fertile topsoil, leaving only the sterile, infertile subsoil. The infiltration rate of heavy soils is quite slow, especially if the soils lack organic matter. These heavy soils are slow to take up water, but hold it tenaciously when the plants need it.

On the other hand, loose sandy soils absorb and release water readily but have only a limited water-holding capacity. The addition of organic matter at or near the surface improves the water relationship of either light or heavy soils by improving their ability to take up or release water more readily, or it increases the waterholding capacity of sandy soils. So, the water-taking, waterholding, or water-releasing capacity of soils for grassed waterways will be improved by the addition of organic matter.

Waterways present the worst erosion hazard on the farm. A vigorous stand of grass is required at these points to prevent damage. Sometimes the stand of grass must be established in a short time between heavy run-offs. The rapidity with which the new stand can be established may determine the difference between success and failure.

Where alluvial deposits of soil have accumulated or where the waterway is located on deep fertile soil, additional fertility may not be needed. However, additional plant food in the form of barnyard manure, commercial fertilizer or leguminous preparatory crops is usually a good investment. Barnyard manure worked into the surface an inch or more during seedbed preparation is less apt to be swept out of the channel by the first runoff than if spread on top. However, the most important thing is to get manure on the waterway. Get fine manure and spread it evenly if possible, but get it on. Poultry manure and

sheep manure are excellent, but whatever kind is to be had, get it on!

The use of phosphatic fertilizers is in its infancy in this area, and there are no extensive data to prove their value. In view of the urgency of getting a good stand quickly and of keeping it in vigorous condition, the use of 200 pounds of 10-20-0 is recommended, especially where the topsoil is thin and the supply of barnyard manure is limited.

The essential steps in seeding grass are:

1. To distribute an adequate amount of seed uniformly over the seeded area.
2. To cover the seed lightly.
3. To press the covering soil down firmly to insure prompt germination and the best possible survival of the seedlings.

Ordinarily, a drill followed by a packer is the best combination of tools to use. If a drill capable of performing these functions is not available, the seed may be broadcast by hand or by a machine. Covering may be accomplished by repeated packing with a toothed or corrugated roller.

It is commonly accepted practice to seed 10 to 15 pounds of brome grass with 3 to 4 pounds alfalfa per acre for establishing pastures in this area. This places from 45 to 70 brome seeds per square foot or far more than enough to make a stand if even half of them produce permanent plants. Because of the urgency of establishing a dense protective cover in waterway channels, twice the normal rate of seeding is recommended. Twenty to thirty pounds of brome grass seed may seem to be a waste of seed. It would be if the seedbed and all conditions were ideal. However, compared with the other expenses involved in vegetating waterways, or compared with the damage which may result if a stand is not obtained, the cost of the seed is inconsequential.

When a good stand is needed at once, it would be penny wise and pound foolish to skimp on seed. As with many important objectives, the waterway situation must be controlled immediately without penny pinching on this or other important factors.

After the seeding and packing operations are completed, the waterway should be mulched with 10 to 15 tons of strawy manure per acre to add to the fertility and to prevent blowing, washing, crusting, or drying out of the surface soil. If manure is not available, straw, hay stack butts, or corn cobs may be substituted.



Terrace outlet with good brome grass, of a kind increasingly popular in Nebraska.

The optimum date of seeding depends on (1) the species of grass being seeded, (2) the soil moisture, (3) the hazard from erosion incurred by waiting for a better season, and (4) grasshopper damage hazard. The advantages of seeding brome grass and alfalfa, wheatgrass, and all of the tame grasses in the fall are (1) the seeded grasses will become established in the fall and will be better able to compete with weedy annual grasses than if seeded in the spring, (2) there is a better chance of the grass becoming well established before being subjected to heavy flows of water because heavy rains occur more frequently in the spring and summer than in the fall. The optimum date is September 1 to 15 unless grasshoppers indicate delayed seeding, but good stands are frequently obtained by seeding in October. Spring seedings should be made immediately following the optimum date for oats or should be delayed until June 1 to 10 to avoid the period of heaviest competition with weeds.

Warm season grasses can seldom be established by drilling seed in the fall. They should be seeded in the spring at the optimum date for planting corn.

The need for protection from run-off water until the grass is established sometimes justifies special precautions. Where the topography will permit temporary diversion dikes may be constructed to keep run-off water out of the channel for a season or two. There will be less damage by erosion in the channel of the temporary diversions if the dikes are constructed from below, leaving surface soil in the temporary water channel.

If the watershed is large or where water cannot be diverted, it is sometimes advisable to do the required channel shaping in June, after the period of the heaviest rainfall. Apply the lime, manure, or fertilizer that will be required for the permanent grass and, after the seedbed has been prepared, broadcast or close drill 30 pounds Sudan grass, 60 pounds of cane or 2 bushels of corn per acre. Mow frequently enough to prevent the formation of seed, leaving a 6- or 8-inch stubble. The forage may be removed for feed or may be left for mulch unless it is heavy enough to interfere with subsequent seeding operations.

Seed the grass legume mixture in the fall or the following spring in the undisturbed stubble.

In conclusion, the water-disposal system is the framework or skeleton of the entire soil conservation program in the area under discussion. Until it is established, or if it fails, none of the other practices can function properly.

Therefore, since it is such a vital part of the entire program it must be made to work and to continue to work. This ideal situation can be approached if not fully achieved, by giving diligent attention to each of the essential points in planning and establishing vegetated water-disposal systems:

1. Adequate design.
2. Careful construction.
3. Selection of adapted species of grasses.
4. Provision for fertility.
5. Timely seeding and packing.
6. Maintenance without abuse.

REVIEWS

BREAKING NEW GROUND. By Gifford Pinchot. 522 pages. Illustrated. Harcourt, Brace & Co., New York, N. Y. 1947. \$5.

Breaking New Ground is "The story of how forestry in America was born and how American forestry in turn gave birth to the conservation policy. It is an outline also of how the conservation of natural resources, and of human resources as well, began to spread from America to all the world as the firm basis of prosperity among men and of lasting peace among nations."

It is disappointing to note that soil conservation was given consideration as early as 1898 but no soil erosion control measures were suggested. In fact, the author may not have sensed the importance of soil conservation, for he states that "A well handled farm gets more and more productive as the years pass. So does a well handled forest. On a badly handled farm, contrariwise, production decreases, the soil washes or blows away, floods are encouraged, and not only the farmer but also the public interest suffer loss. The same is true in general of a badly handled forest except that damage to the public interest is wider and worse." Probably the author did get a faint glimpse of the importance of soil conservation when he stated "It is true, indeed, that the forest rightly handled—given the chance—is next to the earth itself the most useful servant of man." If the word earth as used here is interpreted to mean top soil, then many people will agree that G. P. was on the right track. The proceedings, findings, and recommendations of the Inland Waterways Commission, following the famous trip down the Mississippi River with Teddy Roosevelt in 1907, "pointed out that the annual loss of fertile soil from erosion was about 1 billion tons; that 3 times the 10 million acres then irrigated were irrigable; and that swamp and overflow land enough to support 10 million people could be reclaimed. Further, * * * in those days the Mississippi alone carried yearly to the sea a cubic mile of the richest portions of our richest farms. By now one-third of our top soil, the soil that feeds us all, has been lost for good."

The author determined as early as 1900 that "Overgrazing loosens the soil so that heavy rains sweep it from the hillsides where it belongs and into the streams where it does not belong and so to the sea, silting up reservoirs on the way." He declared, "Overgrazing was largely responsible for the terrible dust storms which so crucified the semiarid waste in the spring of 1935 * * * These dust storms cost the government and the farmers hundreds of millions of dollars and supplied one more demonstration of what individual greed can do to a great public resource under the gentle impulse of its own sweet will." The statement that the 1935 dust storms were largely due to overgrazing is open to question.

Historians may disagree on the importance the author attached to some of his experiences and the parts they

played in the conservation movement of the world. No one will deny that G. P. was an outstanding public leader and a powerful influence for good, not only in forestry but in conservation as a whole.

—JOHN KELLER.

FARM PONDS IN ARIZONA.—Interest in farm ponds continues to grow in the Navajo County Soil Conservation District in Arizona, according to L. K. Armstrong, Soil Conservation Service technician working with the district. Armstrong reports that two new ponds were completed recently with Soil Conservation Service technicians doing the planning and staking, while contractors did the earth moving.

The moving of almost 2,000 cubic yards of earth was involved in the building of L. M. Merkely's pond at Pine-dale. This pond will provide stock water, and water also will be piped to the house and for irrigation of a small garden. A 2,500-foot diversion ditch collects water for the pond. Otherwise, Merkely's farm is nonirrigated and already is being terraced and contour cultivated.

V. B. Peterson at Lakeside also has constructed a farm pond which will serve as a combination overnight irrigation water-storage reservoir and fish pond. A little more than 1,100 cubic yards of earth in the dam will make it possible to store 4½-acre feet of water to a depth of about 10 feet. After irrigation water is drawn off, the water still will be four feet deep, giving plenty of space for fish, Armstrong says.

Peterson already has seeded 4 acres of irrigated pasture on land leveled with the district-owned automatic leveler as part of his complete soil and water conservation plan. This land is being irrigated with contour spreader furrows, 1,450 feet of them, accurately laid out with district assistance.

WIDELY ADOPTED.—Soil conservation districts all over the country are beginning to discover SOIL CONSERVATION Magazine. In ever-increasing numbers they are entering subscriptions on behalf of schools, libraries, farmer-cooperators, and others, as a means of developing an understanding of the principles and practices of the soil conservation program. Banks and civic clubs are also purchasing the periodical in large quantities for farm clients and rural leaders. All orders, \$1 per year in advance, go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

SOIL AND CHURCH

(Continued from page 180)

Of course, the Church must be much more than a soil conservation agency. As a matter of fact, it may render its greatest service, not just dealing with this important subject, but rather, to help rural people catch a vision of what the Christian gospel really is, and how it relates to all of life. It needs to stir the hearts of people to help them help themselves. By the exercise of its traditional functions, carried out with a new content and a new application to rural life and its needs and opportunities, the Church can provide the needed dynamic force that will spell the difference between success and failure in the rebuilding of rural America.

GAINS POSTED IN SOUTHEASTERN STATES

A DIFFERENT STORY TODAY.—"Several years ago I stopped selling milk because I couldn't make it pay. Today it's a different story," reports Lawrence P. Johnson, of Scottsboro, Ala., a cooperator in the Northeast Alabama Soil Conservation District. "This is a direct result of assistance furnished by the Soil Conservation Service technicians in over-all farm planning based on land capabilities. Now I can see my way clear with 45 acres of winter grazing, 12 acres of sericea pasture, 8 acres of Kentucky fescue, and 15 acres of permanent pasture. I will continue to develop my grazing program as outlined by the Soil Conservation Service, because it has proved to be profitable and at the same time is controlling erosion on my farm."

FARM VALUE UP \$10,000.—"Three years ago when you began working in this district, if you had attempted to get me to do all the things I'm doing on my farm, I probably would have ignored the program altogether," said Ed L. Watkins, of Inverness, Fla., a cooperator in the Gulf Soil Conservation District. "As a result of the way it has been handled, all of my farms are now under definite long-time soil conservation plans that fit into my farming program. I believe that on one of these farms alone, the farm value has increased by \$10,000 as a result of what has been done, and I have only gotten started on the program."

IT HAPPENED IN 8 YEARS.—"In 1939 I contacted a newly married farmer regarding a conservation plan on his farm in the Madison County District in Tennessee," reports J. R. Sasser, district conservationist at Jackson, Tenn. "The farm was badly eroded and there were no buildings, other than a log cabin which was used as a home by the farmer and his new wife. The farm was planned, terraces were laid out, rotations were started, waterways were prepared, fences were planned, and a complete soil conservation program was started."

"Soon after planning the farm, I was transferred elsewhere, and subsequently entered military service. After returning to SCS duty I was stationed at Jackson, Tenn., and decided to drive out to the Guy W. Longmire farm and see what progress had been made. The sight was a revelation. Instead of a log cabin, I saw a well-constructed farm house, barn, tool shed, etc. The waterways were neatly clipped, strip crops established, terraces were well maintained, and there was every evidence of a successful farmer."

"When asked about how the program worked out, Mr. Longmire said, 'This way of farming has really paid off for me. I completed the second cycle of my rotation this year and where I used to grow less than 200 pounds of lint cotton an acre I now grow over 500 pounds an acre.'

"To plan a farm and then see 8 years later the plan written on the ground in good conservation practices, with success written all over the farm and the farmer, is an experience well worth remembering."

LIFETIME PROPOSITION.—"When I signed a soil conservation plan with the Robert E. Lee Soil Conservation District, it played hob with the way I used to work," T. H. Tanner, of Appomattox County, Va., wrote B. G. Anderson, district chairman. "Where I used to have to cultivate almost all of the open land on the place to barely make a living, now with normal seasons I can have a surplus of legume seed, corn, wheat, and dairy, pork, and poultry products for sale. Where I used to have to skin every straw, corn fodder, and hay to feed a pair of horses and a few cows, now I can store enough good hay, and leave the residue of wheat straw and corn stalks on the land. Seventeen years ago on a 5½-acre field, I gathered about 10 barrels of corn nubbins. This year I gathered 10 barrels of good corn to the acre on 2½ acres of the same field, which I worked in contour strips. In the other

strips, I harvested good hay, 25 bushels of wheat to the acre, and red clover and lespedeza seed. So please tell new prospects it's not what they do in any one year or two, but it's a lifetime proposition."

BETTER LIVING.—"If my Daddy were living, he wouldn't believe what we are doing," said Lester Guin, of the New Hope Community, a cooperator in the Lowndes County Soil Conservation District in Mississippi. "We boys were raised up thinking that the only way to make a living was by growing cotton and corn and that heavy fertilization would burn up a crop. Now after 5 years of following the district conservation plan, I'm not growing a stalk of cotton, have only half my original cultivated acreage in row crops, and I am making the best living I've ever made and easier, too. With the 100-bushel corn-production plan which looked so good in Lowndes County the past season, I can see how I can cut my plowed land in half again."

MORE MILK WITH KUDZU.—"I was milking 44 cows this past spring when dry weather reduced the grazing on my Bermuda grass and lespedeza pasture to where I was getting only 95 gallons of milk a day from my herd," reports Lonnell Prather, of Harlem, Ga., a cooperator in the Little River Soil Conservation District.

"I was very anxious to get my milk production up, so I let my cows graze on my 7-acre field of kudzu about 3 hours a day. I reduced my concentrate feeds about one-third and the second day after my cows started on the kudzu I was milking 105 to 110 gallons a day."

TECHNICAL WORK WORTH \$20,000.—"You SCS folks have been worth \$20,000 to my farm in the last 7 years," declared C. C. Holland, of Statesville, N. C., a cooperator in the Middle Yadkin Soil Conservation District. "For 5 years, my 400-acre farm didn't make enough to pay the taxes. The tenants patched around between gullies with cotton, and wheat ran about 8 bushels an acre. The SCS folks showed me how to handle my land. I did everything to the farm that they told me it needed, and last year, after 7 years, my wheat averaged 39 bushels an acre instead of 8. I'm proud as I can be of my farm now. It's a sight. There are 275 acres of fine alfalfa on the farm now, all put in where gullies used to be. My two boys are back from overseas and they are surprised and pleased. They plan to take over the farm."

EVERY TEACHER SHOULD KNOW.—"I have been looking at these hills all my life, but not until today have I seen them," commented Miss Emma Branch Cunningham, teacher in the Belton, S. C., city schools, during a soil-conservation tour. "Every teacher in South Carolina should have an opportunity to see what has happened to our soil and what can be done to conserve and improve it."



PREREQUISITE TO PROGRESS.—"This farm plan is what I have wanted," declared H. J. Bilharz, of Louisville, Ky., who owns and operates a 600-acre farm in Oldham County Soil Conservation District. "I now have a definite, clear plan to follow, and I value this plan at \$1,500."



INCREASED FORAGE.—In 1942 Walter Sneddon began improving his farm's irrigation system, leveling fields, installing concrete drops, checks and turnouts in ditches, and working out a crop rotation which included a soil-building crop of irrigated pasture. Sneddon's farm is north of Salida, Colo., in the Upper Arkansas Soil Conservation District.

Ten years ago, a 26-acre alfalfa field on this farm brought a gross income of \$25 per acre. By 1943 the alfalfa was thinning out and Sneddon planted a grass seed mixture recommended by the Soil Conservation Service.

In 1947, this same field brought a net return of \$117.23 per acre. Sneddon attributes this to the greater forage production and to the "cafeteria style" feeding. In addition to the increased income, the sandy, erodible fields were not damaged by wind or water erosion, a minimum of irrigation water was used, and harvesting and hay-labor problems were nonexistent. "I'm seriously considering putting in all my irrigated land to pasture grass and buying alfalfa and grain needed for supplemental and winter feed from my neighbors," Sneddon said recently.

SAGEBRUSH AND SLOPES.—Restoring 20 acres of burned-over sagebrush land to a profitable grazing area and at the same time checking severe erosion on the tract through use of soil- and water conservation practices has been the experience of Lorin S. Roundy of Alton, Utah.

This sagebrush area, on a steep hill slope averaging 15 percent was swept by a range fire in 1944. During the following year the denuded 20 acres became subject to severe sheet and gully erosion, so Roundy realized that he must do something if he were to save the productive soil.

He then made application to the Kane County Soil Conservation District for technical assistance in solving his problem. Boyd A. Murray, Soil Conservation Service representative working with the district, accompanied Roundy over the area. Together, they worked out a complete soil- and water-conservation program.

This plan, completed in October 1945, called for brush check dams in all active gullies, and the reseeding of the entire area to prevent further run-off and loss of soil.

Roundy built the brush dams in the worst gullies immediately, and then prepared to plant the area to a mixture of crested and Western wheatgrasses. However, he soon realized that the seeding of range land on a 15-percent slope would be a difficult problem. The area was covered with hoarhound, a perennial weed, and sunflowers. Realizing the danger of plowing such land to kill weeds, Roundy broadcast the grass mixture, and then covered it by using a cultivator on the contour. He figured that the contours would hold enough moisture to establish the grass regardless of the heavy weed infestation.

The area was planted on November 20, 1945, and although precipitation for 1945 and 1946 was below normal,

the seed germinated early in April 1946. Most of the crested wheat headed out last year, and now an excellent stand of grass covers the 20 acres.

Although the area was ready for grazing just a year after being seeded, Roundy has not overlooked the need for protecting against overgrazing, and leaves an average stubble height of three inches over the old sagebrush land.

CROP STUBBLE CONSERVES MOISTURE.—Despite the drouth this year, Frank Konopasek, a cooperator with the Roosevelt Soil Conservation District who farms three miles east of Portales, N. Mex., reports that he was able to produce good crops as a result of following soil and water conservation practices.

"My Spanish peanuts made 19 bushels to the acre, and my hegari yielded 200 bundles with well-filled heads of grain," Konopasek said. "I consider my crops no better than might have been produced on any deep sandy soil similar to mine if proper practices are used."

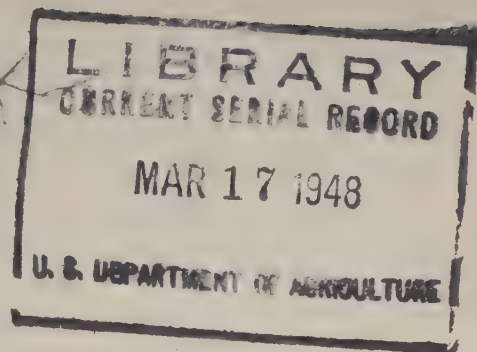
"A lot depends on the way the land is handled," he continued. "With our limited rainfall we can't afford to let weeds take any of the moisture. Furthermore, we can prevent a lot of moisture loss by timely tillage and proper use of crop stubble. Crop rotation is another practice which I follow regularly. I never plant the same crops on the same land in successive years. When crops are harvested I leave plenty of stubble and stalks to check soil blowing."



GRASS MAGIC.—Ralph Wann, owner of a large ranch in the Turkey Creek Soil Conservation District, in Pueblo and Fremont Counties of Colorado, knows the results of soil and water conservation on range land.

In 1944, when he took over this ranch, it had been heavily grazed and had only one watering place for 54,000 acres of pasture. It had then an estimated carrying capacity of 200 head of cattle.

Wann started out by "resting" the land for one year and installing developments to provide adequate livestock water. He then began to stock conservatively, according to the forage produced. He continued this conservative stocking, increasing his livestock numbers only as fast as the range recovered. He fed phosphate salt to supplement mineral-deficient grasses, and has changed things so that observers say it "isn't the same ranch." His grass has vigor and puts on good growth. In 1947 he had grama grass seed stalks 30 inches tall. And in 1947 he had forage for 1,000 head of cattle, as contrasted with 200 6 years before.



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APRIL 1948

SOIL CONSERVATION

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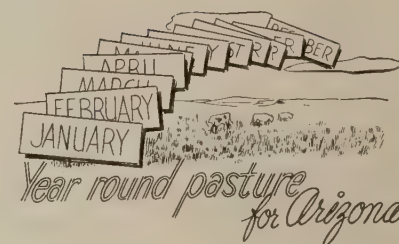
SOIL CONSERVATION •

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WELLINGTON BRINK

Editor

Art Work by

W. HOWARD MARTIN

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GREEN PASTURES SOUGHT.—Several varieties of grass new to this area are being tried on irrigated pasture land in Cochise County, Ariz., in an effort to get green pasture during most of the year and to obtain the greatest possible forage with a minimum of water and labor, according to representatives of the Soil Conservation Service who are furnishing technical assistance, in addition to seed of uncommon varieties and "trial types."

Grass which will last through midsummer heat as well as during cooler weather is being sought, according to Walter L. Diehl, district conservationist. After further trials, it is planned to mix seeds of various species in order to have green pastures during most of the year.

Semipermanent pastures which can supply forage without further planting for several years are another objective. Such pastures would require no labor except that involved in irrigation, Diehl points out.

John Saylor, farming near Elfrida, is trying mammoth red clover, Hubam clover, rescue grass, and both meadow and tall fescue grasses. He also is continuing use of giant panic and Harding grass.

Others trying new varieties of seeds are Joe Peevey of Elfrida, and Robert Kline of Hereford. Kline has been experimenting

(Continued on p. 205)

THE COVER.—Strip cropping on farm of Mrs. Virginia R. Kidd, Greenbrier County, W. Va. The 4-year rotation uses corn, wheat, and 2 years of meadow. The photo was made last year by Hermann Postlethwaite.



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They came dressed in field clothes for the last meeting. President Van Dyke faces model farmstead, which is being discussed by an agricultural engineer of Missouri's Extension Service.

“

City Farmers

GET EXCITED OVER

Maps”

By HOWARD C. JACKSON

THIRTY busy city executives and businessmen—members of the St. Louis Club—went to school five nights, starting on the evening of November 13, at the LaDue Community Hall in St. Louis.

The class was called to order and the “teachers” were presented by the club’s president, J. R. Van Dyke. “What’s all this about?” asked a curious outsider.

It’s not an old story but a brand new venture into a greater appreciation of the land, our natural resources and agricultural activities. Here’s how it all came about. In 1945 the St. Louis Chamber of Commerce renewed its interest in agricultural affairs and hired a full-time director for the Agricultural Bureau. Hugh Steavenson, for 10 years manager of the Elsberry, Mo., Soil Conservation Service Nursery, started things humming. The St. Louis Farmer’s Club is a separate unit of the chamber made up of members who own farms. They are so-called city farmers, always quick to try a new idea and eager to learn.

President Van Dyke had attended a series of farm planning meetings in the soil conservation district of Callaway County, where his 1,010-acre

farm is located. He was anxious for many of his city-farmer friends to have a similar opportunity. Sounding out a few of his cronies, he conceived the idea of having a school in St. Louis for these city farmers at which time they would discuss their farms just as his farm was discussed at soil conservation district meetings out in the country.

Enthusiasm snow-balled and Secretary Steavenson says that “within 2 days after the first announcement went out to our Farmer’s Club members we had the full enrollment for the school.” Farms are owned by the members of the club over a wide area, ranging from northwest Tennessee and western Missouri to the local area within 100 miles of St. Louis in Illinois and Missouri. There naturally was a wide variation in soil, type, climate, crops, and problems of erosion and drainage.

President Van Dyke appealed for help to the Soil Conservation Service and to the College of Agriculture at the University of Missouri. The Soil Conservation Service agreed to make a conservation farm survey of as many of the farms as time would permit. Technicians of that agency used the aerial photographs furnished by the mem-

NOTE.—Mr. Jackson is assistant State conservationist for Missouri.

bers and walked over each farm, making borings with the soil auger, observing and mapping soil differences, and marking all these conditions on the photographs. This was a soil conservation survey. Each field of each farm was classified according to its land use capability class, using the regular procedure available to all soil conservation districts.

Harold E. Grogger, State soil scientist, was one of the teachers at the first meeting. After a detailed discussion of what soil really is and how it responds, Grogger flashed these maps on the city farmers, who prized them like a boy with a new toy. Considerable chiding took place as someone would point to a lot of orange land, for example, class VII, best used for the production of grass and trees, while another city farmer would boast jokingly about his big spot of green or yellow land which the map told him in a flash was made up of classes I and II, suitable for cropland if properly managed.

President Van Dyke, in commenting on the five meetings, averred that "It would be impossible to overemphasize the importance of the maps which made it possible for each individual farmer to bring his own particular problems right into the class, and the discussion of soils by Grogger and Tayloe in the initial meeting got us off to a fine start."

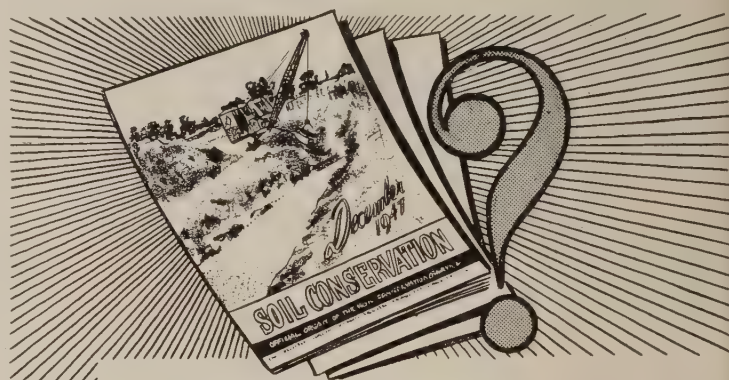
A veteran farm planner of the Service, William L. (Bill) Tayloe, was really the key to the instruction series. He conducted the Callaway District meeting which gave Van Dyke the germ of the idea. It was logical that he should be selected by the Soil Conservation Service to attend all five meetings. The University of Missouri, through its extension service, assigned Dorris Brown, farm planning specialist, as its representative.

Tayloe and Brown were the moderators chosen to pick up the loose ends and make all the answers as clear as possible. St. Louis County Agent Paul Bernard and Brown helped to arrange for outside speakers which included a soil specialist, a livestock specialist, and two agricultural engineers.

The meetings were purposely spaced close together so that interest and enthusiasm would be maintained at high pitch from one meeting to the next. The second meeting was held just 5 days after "school" opened. The third meeting was on November 25, the fourth on December 2, and the fifth and final meeting was on December 9. To

add a little spice to the last meeting the members all dressed in overalls and field clothes and followed the session with a social hour.

According to Bill Tayloe, they referred to their teachers at this last meeting as the "city slickers." On this occasion Tayloe summarized what had gone before. He pointed out how the information given the individual owner could be used in developing a farm plan. First he stressed the land-class map, reviewing what it was for, and how it could be used; second, the cropping systems and how the systems should be selected based on the map; third, the productivity, which must be "plus" and must furnish, if possible, pasture,



WHAT DISTRICT WILL BE NEXT—Supervisors of the Weakley County Soil Conservation District in Tennessee are using *Soil Conservation Magazine* as a tool for speeding conservation work in the district.

At a recent board meeting the supervisors voted unanimously to pay for 100 yearly subscriptions to the magazine, for distribution as follows:

- Forty elementary schools, 6 high schools, 9 Negro schools.

- Twenty-two instructors of GI agricultural classes.

- Five district supervisors.

- Eighteen other copies to be sent to the University of Tennessee Junior College, president of the county Farm Bureau, the county agent, the county judge, Boy Scout troops, the key banker, and the editors of Weakley County newspapers.

"I think this project will pay off in increased interest in conservation of our soil, particularly out where the knowledge is needed in our rural schools," said L. L. Olds, who has been chairman of the supervisors since the district was organized by farmers in 1940.

Olds has sent a letter to each person receiving the magazine telling him that it is a gift of the district, and why.

Other members of the board of supervisors are Waymon Gaylord, vice chairman and treasurer; G. F. Roberts, G. W. Gibbs, and Wayne Parham.



These business men have a direct personal stake in the land. They are members of the St. Louis Farmers Club listening to discussion of farm conservation planning. Each man has a farm of his own which he wants to have managed the modern conservation way.

roughage, and grain for the selected livestock; fourth, treatments calculated to produce quality hay and pasture; fifth, the supporting or so-called conservation practices, designed to support the cropping system, and selected and planned to fit the farm. He reviewed and emphasized the livestock factors. Tayloe declared that livestock should be selected to fit the land class and the kind of supporting practices that are practical, and that practices should be adopted which the owner or operator is willing to use. In concluding his remarks, Tayloe said, "Begin with your farm—the map brings it down to a size you can use. Plan a cropping system that fits the farm. Then use livestock to utilize the feed the farm can produce best." He suggested that his hearers constantly remind themselves: "This is my farm. Always remember it must produce after I am through."

Before the meetings had ended at least five of these business men—farmers whose farms were located within a soil conservation district—had inquired of the district supervisors concerning an application for the development of a complete conservation plan. Among those who had intended to start early were William H. Bixby, D.

Ross Hagan, Elmer E. Marks, Harry H. Crane, and John L. Patterson.

Mayor E. S. Funsten of LaDue, who operates a 365-acre farm in St. Louis County and also is a member of the farmer's club, welcomed the group to his community. Mayor Funsten declared that this was the first time such a school in conservation farm planning had ever been conducted. LaDue, he said, is proud to be in the list of "firsts" on conservation activities. "I hope this idea will spread to other city farmer's clubs."

The attendance was excellent notwithstanding heavy business and social commitments and frequent out-of-town engagements. Twenty-five of these busy men, out of the 30 who enrolled were regularly present.

Nearly all have an incurable love of the land and will drop important business activities to discuss farm topics.

The St. Louis Farmer's Club is one of several such metropolitan clubs in the Nation. According to the 1947 records, these clubs have 258 members owning 300,000 acres of land with an estimated value of \$12,000,000. They hold regular meetings to which are attracted some of the outstanding agricultural leaders of America.

FIRE FIGHTING SAVES THE RANGE



Back-pack pump in action.

By ROSS D. DAVIES

ONE OF THE MOST dramatic fire stories in recent years in the Northern Great Plains unfolded itself in central South Dakota during the past summer.

It saw flames sweep uncontrolled over one farm-ranch community, while the people fought bitterly to stem their progress.

And it saw another ranch community almost "next door," lacking communication facilities but organized and equipped, stop fire in its tracks time after time almost as soon as it started.

One of these communities came out of the summer with its range burned, many of its haystacks and livestock, fences, and even some of its farm buildings and homes destroyed. The other wound up the season with its resources in grass, feed stocks, and livestock in unusually good shape.

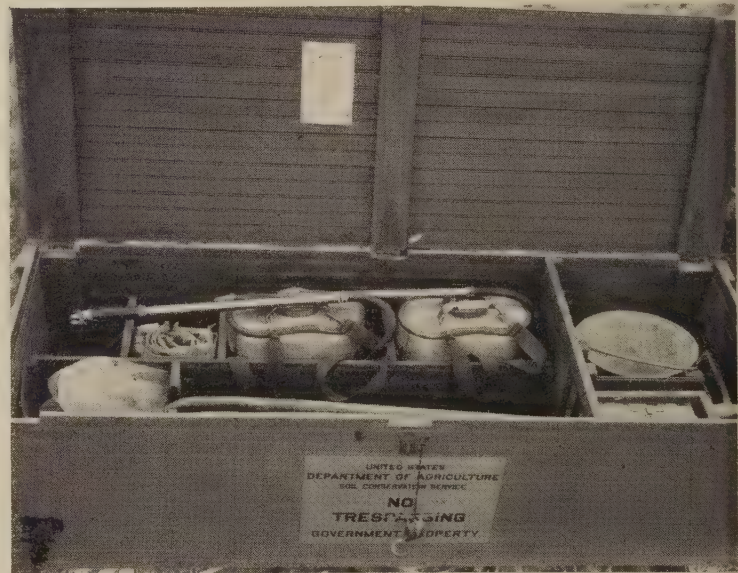
The fire that swept through a 500-square-mile area in Hyde, Faulk, Sully, and Potter Counties in September was big news, a major tragedy. It actually burned over an area of about 160,000 acres. The battle by farmers and ranchers to save their livestock, their homes, was heroic. It was reminiscent of the stirring tales of yesteryear when rushing walls of fire drove down on man and beast.

NOTE.—The author is state conservationist, Soil Conservation Service, Huron, S. Dak.

But the quiet efficiency of the other community, where 20 fires started during the season, attracted little attention outside of its boundaries. Yet the struggle against fire was just as tense and exciting to those concerned. It was just that "nothing happened."

This community is the Land Utilization project south of Fort Pierre, an area just west of the Missouri River about 18 by 20 miles, containing some 230,000 acres. Most of it is grassland, about half of it having been bought by the Federal Government during the submarginal land purchase program. Highway 83 crosses it.

In this area, the Soil Conservation Service, which administers the land, has cooperated with local ranchers to help them develop stable, family-size livestock units. The Service has leased the lands to the local grazing districts for a long term of years, and supplies technical aid in managing the lands. Directors of the grazing district grant grazing privileges to members in accordance with the terms of the lease agreement.



Typical fire-tool cache. You'll usually find them at headquarters of fire wardens appointed by grazing association directors.

And since the Soil Conservation Service has a big stake in the area, Martin Reinholt, the agency's technician there, helped the ranchers organize and equip to control fire. The Service supplied a truck equipped with a water tank, back-pack pumps and long-handled swatters, to which the local stockmen added other fire-fighting equipment. The truck is kept at a central location, ready for use. The Service also supplies some

back-pack pumps, swatters and shovels for four fire-tool caches that are located at strategic places in the project area.

The grazing district built its part of the 120 miles of plowed fire guards and maintains all of them, appointed four fire wardens at whose headquarters the tool caches are kept, and this year bought enough more back-pack pumps so that each rancher in the area would have one. All ranchers, of course, are on call for fire, and tractors and plows are kept ready for use. Highway patrolmen working in the area did their share in keeping a lookout, and helping to fight fires when they broke out.

This organization extends even to the people in the towns in or near the area—Fort Pierre, Draper, Vivian, and Presho. There, the volunteer fire departments are kept ready for call, although the complete lack of telephones makes it necessary for someone to drive to town when their help is needed.

The last year gave the fire-control set-up a se-

vere test. Controlled grazing and good weather the last several years has resulted in an unusually heavy stand of grass. There was lots of fuel for fire. And the season was hazardous, with a long dry season, many electrical storms, and high, scorching winds. The stage was all set for trouble—plenty of it.

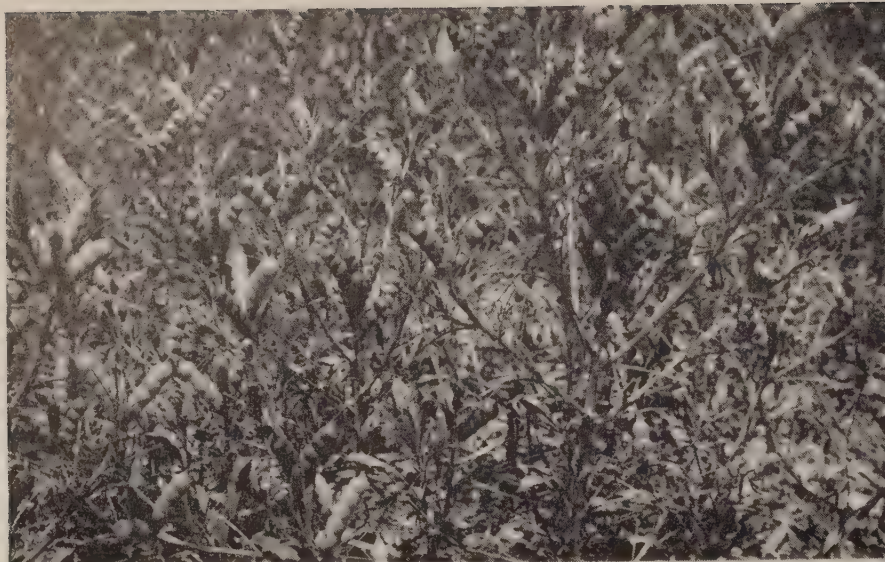
Lightning set 19 fires and man caused one. Any of them could easily have gone racing over the hills, devouring grass, animals, fences, homes. But instead, a total of slightly less than 2 square miles was burned over. That is less than six-tenths of 1 percent of the area. The largest fire covered 200 acres; the average for all was 66 acres.

Keen, almost jittery, watchfulness by the ranchers and the way they work together through organization have been as big factors in this fire-control record as equipment. It is this that had made "hitting a fire fast" one of their characteristics, although without effective equipment they would not be able to do much.

(Continued on page 204)



One of the fire trucks supplied to land utilization projects by Soil Conservation Service in its cooperation with local ranchers for protection of grazing resources from fire.



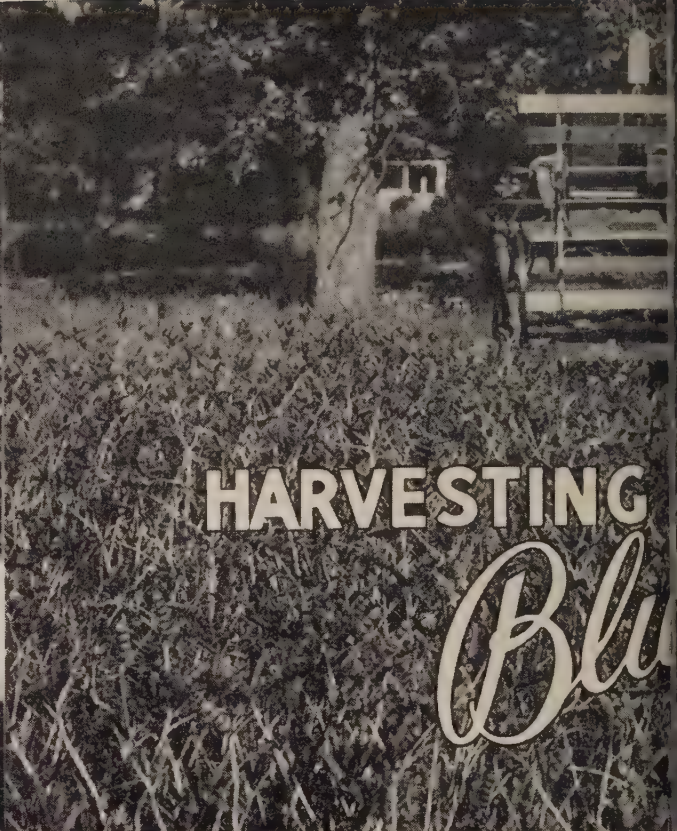
Blue lupine (*Lupinus angustifolius* L.) is of growing importance to soil conservation farmers. At this stage of ripeness, the seeds are almost ready for harvesting. They ripen unevenly.



Harvesting by combine on terraced land. Terraces in background are planted to watermelons. These pictures were all made in Georgia. Green seed call for careful cleaning and storage.



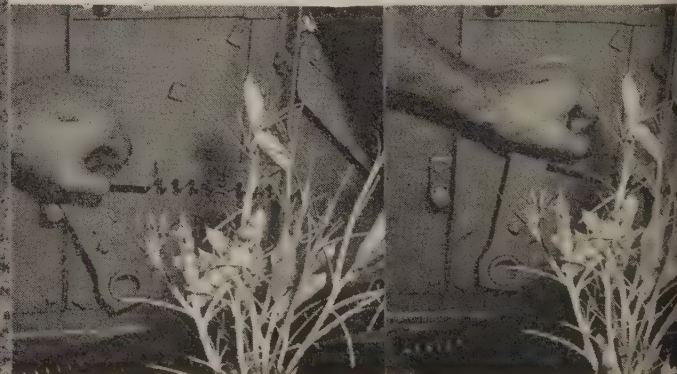
Frequent examination of seed coming from combine is necessary in order to make any adjustments of the machine that are indicated to operate at top efficiency.



Best results are obtained when blue lupine is harvested in the morning, late in the evening and through shattering. They use the middle of the day for cleaning.



Blue lupine seed directly off combine showing green seeds, green pods, sticks, cracked seed, and other foreign matter that must be removed before putting on market.



In combining blue lupine seed, the speed of beans, peanuts, and peas. All field harvesters should be adjusted to operate at top efficiency. Too high cy

Lupine SEED

PHOTO STORY BY
HERMANN POSTLETHWAITE

slightly damp. Many farmers do it early
t. In this way they reduce the amount of
work on small grains and other tasks.



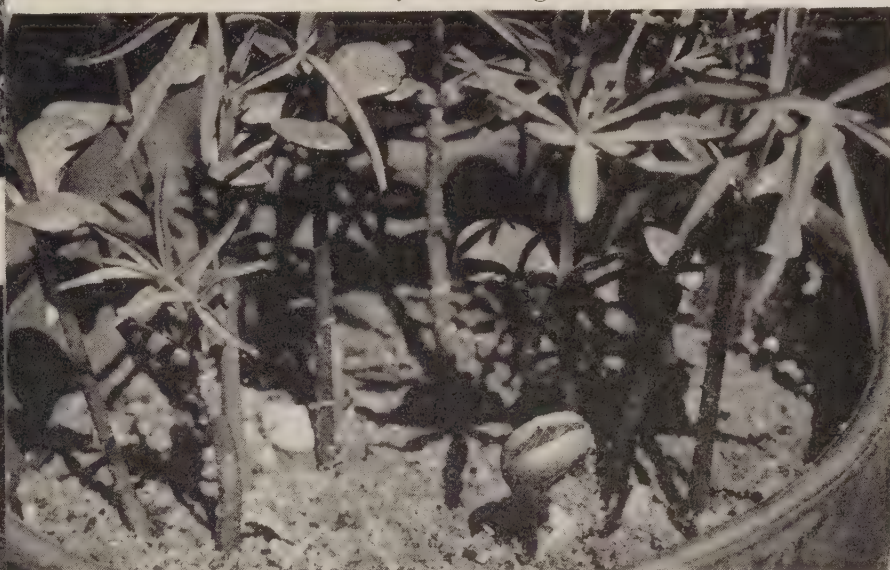
Dirt separated from seed by cleaning. For-
eign matter interferes with drilling. Poor
germination will result unless moisture can be
held to about 12 percent.



cylinder should be reduced to that for edible
adjustable cylinder, fan speed, and shaker
will crack the seeds.



After the blue lupine seed has gone through the cleaning
machine it is weighed into sacks of 100 pounds each; the
sacks are sewed up and tagged with the owner's name,
ready for storage.



Test sprouting by farmer to show the percentage of germi-
nation. Like all beans, blue lupine must not be planted
too deep. Otherwise the sprouts cannot break the surface
of the soil.



Taking samples for moisture determination. If heating
develops, more air must be provided. It occasionally may
be advisable to spread seed out on floor before sacking.



Redman "look" in 1947. Contour strips of wheat and meadow to left of highway; strips of corn and oats to right of barn. To north of barn are the two farm ponds.

Top Award to Ohio Farmer

WILLIAM REDMAN, of Zanesville, Ohio, is the 1947 champ in the system-wide soil-conservation contest of the Baltimore & Ohio Railroad. For being top man among competing farmers, he received a 40-ton carload of bagged kiln-dried agricultural limestone and a certificate of achievement signed by Hugh Bennett, chief of the Soil Conservation Service; R. B. White, railroad president; and H. C. Ramsower, director of the Ohio Extension Service.

State winners were: Illinois—Rolie Eakin, Vandalia; Quinton Taylor, Cerro Gordo. Indiana—Carl Harvey, Kendallville; Ernest B. Miller, Bicknell; Doris Salsman, Greencastle. Ohio—William Redman, Zanesville; Paul Herd, East Liberty; Clarence Schissler, Carrollton. West Virginia—Paul Nutter, Auburn; L. H. Ripley, Alma; J. and I. D. Van Metre, Martinsburg. Maryland—Perry Steiding, Accident. Pennsylvania—Hugh H. Brown, Indiana. New York—Arthur Roeske, Independence.

Redman's 362-acre farm features the raising of shorthorn cattle for breeding purposes. Between October 1946 and October 1947 a wide array of conservation practices were put on the land. High lights of progress included 66 acres in conservation rotations; 66 acres in contour strip cropping; 1,460 feet of sod waterways, 250 tons of lime on cropland, 100 tons of lime on permanent pastures, 10 tons of fertilizer on permanent pastures, 114 acres mowing of permanent pastures, 80 acres rotation of grazing permanent pastures, 1 new farm



Dale and Dwight with polled shorthorn heifer which won first prize over all beef breeds competing in 4-H Club project.



Redman's first pond was constructed in 1935. A second pond was provided in the spring of 1947.

pond and 2 feet in depth added to old pond, 45 acres of woods protected from grazing and from fire, 3 acres of woodland plantings, 2 acres of wildlife plantings, 2 acres of field-border management, 1,320 lineal feet of field diversion ditches, 6 acres of trash-mulch seeding. Eight hundred rods of fencing on contour, 55 acres of clearing locusts

and brush for pasture and cropland, 5 acres of old orchard land cleared for cropland, 1,570 cubic yards of earth moved to fill in gullies.

This is just part of the story of soil-conservation progress on one farm in one year. H. J. Muse, work unit conservationist of the Soil Conservation Service, supplied technical advice. The Redman



Awards committee: Glenn E. Riddell, representing cooperative relations, Soil Conservation Service and Extension Service; Hugh Bennett, chief of the Soil Conservation Service; O. K. Quivey, manager of agricultural development, Baltimore and Ohio Railroad.

FIRE FIGHTING SAVES RANGE

(Continued from page 199)

From force of habit, these ranchers are ever on the lookout for smoke during the summer. None of them slept through an electrical storm at night. Instead, they were up, watching the sky for the telltale glare of fire.

Once flames or smoke are sighted, action starts. One man heads for the fire with the back-pack pump at the ranch, another goes to warn neighbors and get the truck with the water tank, and the rest of the ranch crew scurries to the nearest tool cache. Men are fighting the fire in a short time. And if more are needed, they can be brought from the towns.

Thus, Confederate Joe Jackson's slogan, "git there fustest with the mostest," pays out on these ranches. It pays well in resources saved—grass, hay, livestock, homes protected from fire.

The ranchers in the Land Utilization project don't have to look far to see how well it pays. A sign along the highway near Highmore says: "This \$2,000,000 fire was caused by a cigarette. Be careful."



Fire guards help check run of flames across prairie. They're useful also when it's necessary to start a back-fire to check flames driven by strong winds.

SOIL CONSERVATION PAYS ITS WAY.—"The soil conservation district program in Martin County has not cost the United States Government one penny," declared C. U. Rogers of Williamstown, N. C., a supervisor of the Coastal Plain Soil Conservation District. "From one field I tile drained, I have already got more than \$1,500 increase in cash income. There are many other farmers who have received similar results. The additional Federal income taxes which we pay on the increased income from these conservation practices will pay several times the amount the Federal Government pays in salaries to the Soil Conservation Service employees in Martin County. And I am sure we would have put in very little tile, or built very few terraces without the technical aid received from the Soil Conservation Service."



This family is a winner: back row—W. O. Redman, Mrs. W. O. Redman, Mrs. William Redman, William Redman; front row—Dwight, Rosan, Dale.

saga was told enthusiastically—and officially—by the board of supervisors of the Muskingum County Soil Conservation District, which offered this farmer as its candidate for top honors.

Why should a railroad be interested in encouraging soil conservation along its lines? O. K. Quivey, Baltimore & Ohio's manager of agricultural development, puts the answer neatly: "Railroad carloadings do not come from areas of abandoned farms, but rather from areas of productive farms such as that owned and operated by Mr. Redman and other farmers in the contest."

REPORT ON ROTATIONS.—Crop rotations are paying off to valley farmers in the Roswell, N. Mex., area, according to C. E. Olson, representative of the Soil Conservation Service in this area.

Olson cites the case of O. F. Crawford, who bought a 40-acre farm in February 1947 and now is cooperating with the Roswell Soil Conservation District. One 10-acre field had been in alfalfa for 2 years, while the other 30-acre field had been in row crops for about 10 years. Both fields were planted to cotton in 1947. The 10-acre field formerly in alfalfa produced approximately 2½ bales of cotton to the acre, while the other field produced a scant three-fourths bale to the acre, Olson says.

PAID WITH A SMILE.—"I have never seen anyone as glad to pay a bill as the farmers cooperating with the West Otter Tail Soil Conservation District when they come to my office to pay for the loan of district equipment used in drainage work in connection with their conservation plans. That is a real tribute to the kind of work being done," says Knute Hanson, bookkeeper for the West Otter Tail Soil Conservation District, Fergus Falls, Minn.

GREEN PASTURES SOUGHT

(Continued from page 194)

for several years with varieties of pasture grass.

Eugene C. Hill, Jr., dairyman in the Double Adobe community, has expressed interest in the possibility that some of the imported species may compete with other forage crops for dairy cows.

Other grasses that have been tried in recent years with varying degrees of success include orchard grass, perennial rye, dallis grass, alsike clover, ladino clover, and sweetclover.

Revegetation of range land in this area as an erosion-control project also is under way. According to Diehl, this will be beneficial both for erosion control and for conservation of water for range forage in nonirrigated areas. The principal species adaptable in this area has been found to be Lehmann lovegrass. Three other species of lovegrass, imported from Africa and improved, also are being tried. Giant panic grass is being used in swales. Bristle grass, Indian grass and California cottontop are being tried. A large number of farmers and ranchers in this area are taking part in the revegetation program.

The Soil Conservation Service nursery at Tucson is furnishing most of the seed for these trials, and is assisting in carrying out the experiments in cooperation with the soil conservation districts in Cochise County.

ADVICE TO BANK ON.—Last summer a group of Federal Land Bank officials visited the farm of S. B. Huff, supervisor of the Greenville County Soil Conservation District in South Carolina. Huff reported increases in yields of cotton from 300 to 400 pounds per acre, corn from 15 to 25 bushels, oats from 20 to 40 bushels, wheat from 15 to 25 bushels. These increases, he explained, were mainly due to good terraces and the rotation of small grain with lespedeza in contour strips, as a part of the plan developed with assistance from Soil Conservation Service technicians. From the 40 acres of annual lespedeza, he said, he was getting a ton of hay and 400 pounds of seed to the acre. He concluded with this statement, "Gentlemen, your borrowers are going to have to practice soil conservation or you are going to have to go out of business."

ADVICE, PLUS.—"I get lots of good advice and suggestions from other sources, but Soil Conservation Service employees are the only ones who actually show me how to apply and carry out conservation practices on the land," commented Lewis Hill, of Richmond, Ky., a cooperator in the Warren County Soil Conservation District.



JACKRABBITS AND JUNIPER

The fabled jackrabbit, a familiar sight on many a Texas prairie, done been a-totin' cedar tree seed out on rangeland. And the trees which have resulted have been using up space, moisture and nutrients, thereby lowering the ability of the grassland to put pounds on livestock.

Simon E. Wolff, of the Soil Conservation Service regional nursery division at Fort Worth, recently has completed a 3-year investigation of the spread of juniper trees—more often called cedar. Wolff found that 18,000,000 Texas and Oklahoma acres have been infested by cedars, mostly redberry and Ashe, well known as the mountain cedar. The redberry is *Juniperus pinchoti*; the Ashe is *Juniperus ashei*.

His investigation confirmed the widely held belief that birds spread a great deal of cedar seed in their droppings. In addition, Wolff discovered that the jackrabbits are just about as potent as the birds in carrying seed. Particularly is that true in open grassland. Birds usually light in trees or on fences and it is at such locations that their droppings result in the seedlings, according to Wolff. Jackrabbits roam the grassland where birds don't usually stop, and it is there they drop the seed in the pellets. The rabbits sometimes carry seed as far as a mile from the nearest tree.

Wolff states that jackrabbits don't crack the cedar seed as they eat. The seed passes through their digestive tracts almost unscathed. He found that during the winter months almost half the food of jackrabbits living in redberry juniper country consists of the fruit of that tree. Cottontail rabbits, he learned, eat and spread quite a bit of Ashe juniper seed.

Rabbits always have carried cedar seed to grassland, Wolff points out, but it is only since heavy use of range has lowered stamina and abundance of the climax grasses that the cedars have been able to sprout and compete successfully for available plant growth elements. The reduced cover has contributed to a vast increase in the number of rabbits and the increased number of rabbits has speeded the spread of cedar. Wolff concludes that while the jackrabbits and cottontails are carriers, the real reason for spread of juniper is the continuous overuse of the range since it was fenced. Furthermore, asserts Wolff, careful balancing of forage growth use will keep cedar from invading most good grassland.

REVIEWS

HEAVEN'S TABLELAND. By Vance Johnson. The Farrar, Straus & Co., 1947. 288 pages. Price \$3.

This book should be read by all prospective land purchasers, newcomers, and would-be farmers in the southern Great Plains. It should also be interesting to the businessmen, farmers, ranchers, and others who now live there—especially to those who expect to continue to live there. It will be interesting to those who lived in western Kansas, eastern Colorado, eastern New Mexico, or western Texas or Oklahoma at any time during the past 70 years. It should be required reading for all who are interested in soil conservation or the continued productivity of the land and the prosperity of the Plains.

"Heaven's Tableland" is mainly about the agricultural history of the southern Great Plains with special reference as to what might have been, what is, and what may be in the future. The dominating influence of the weather on all past and future agriculture of the area is emphasized; but it is pointed out that man's use of the land may offset most of the weather hazards.

The book is well organized, readable, and probably the most interesting book ever written about the "dust bowl." It is not limited to a discussion of the dust bowl of the thirties; but deals with all phases of Plains settlement and development, including droughts, dust storms, and blizzards. It even includes information about the prehistoric agriculture of the Indians of the region. You will not lay this book down, once started.

Vance Johnson, who was a reporter and the editor of the Amarillo News during all the dust bowl years of the thirties, has done some comprehensive research on the agricultural history of the Plains. He starts with the Panhandle Man, who farmed portions of the Texas Panhandle prior to the fourteenth century. He describes briefly the irrigation systems of prehistoric Indians in southwestern Kansas. He does not attempt to prove that the early agriculture of these Indians was wiped out by long and protracted droughts, but does point out the facts that leave that inference.

He traces the history of settlement and agriculture of the region rather fully from Civil War days to 1946. Emphasis is placed on the spectacular weather variations that have done so much to shape the patterns of settlement and agriculture. The blizzard of 1886 that wiped out much of the cattle industry, the drought of the early nineties that drove so many of the homesteaders back east, and the drought of 1910 to 1913 that created the dust bowl in Thomas County, Kans., are given special treatment. The land booms of 1809 to 1910 and 1915 to 1929 are discussed more or less in detail. Campbell's dust-mulch theory of moisture conservation and Post's rainmaking experiments are given rather extensive treatment; as are Payne's experiments and findings at the Dry Land Experiment Station at Cheyenne Wells, Colo., But Vance reserves his main discussion for the dust bowl

of the thirties. And the last chapter of the book, entitled "Here We Go Again," is devoted to the land boom that got under way with World War II and is still continuing.

This discussion of the dust bowl is as interesting as most fiction and just about as readable. It not only tells about the dust and the hardships of the people who had to endure it, but also about the various measures that were used to control soil blowing. The Government efforts toward wind erosion control are discussed in some detail, as are the efforts of various individual farmers and ranchers. Special credit is given to the Soil Conservation Service and other Government agencies and to some of the individuals working for the various agencies. But the role that the weather played in curing the dust bowl is emphasized.

This book will probably not be so popular in the old dust bowl region as it will be in other sections of the country, so long as favorable weather continues on the Plains. If we should have another drought and dust bowl in this region, however, this book will probably be one of the publications most in demand by those who live or work there.

Vance Johnson is a plainsman himself and apparently has a real love for the Plains and those who live there. This is indicated many times throughout the book and especially in the selection of the title, which comes from an old hymn that was fairly common among early settlers of the area.

Lord, lift me up and let me stand
By faith on Heaven's tableland;
A higher plane than I have found,
Lord, plant my feet on higher ground.

But Vance seems to have little patience with or regard for those who attempt to wantonly exploit the land for immediate personal gain; especially for speculators and suitcase farmers who are only fair weather residents and expect to run for cover, back to their permanent homes in Dallas, Oklahoma City, or Kansas City as soon as the dust begins to blow.—TOM DALE.

SCHOOL GETS HIGHER MARK.—R. M. Sanford, head farmer for the Walter E. Fernald School Farm at Waltham, Mass., reports that as a result of practicing soil and moisture conservation he has been able to increase truck crop yields approximately 27 percent. Mr. Sanford states that he is now able to produce as many vegetables on 35 acres, as he was able to produce on 42 acres before the conservation plan was adopted. The 9 acres that were formerly used for truck crops are now used for the production of hay. This program was started in 1940 as a demonstration farm under the supervision of Soil Conservation Service—Extension Service. Strip cropping, contour tillage, diversion ditches, and cover crops are the principal conservation practices.

SUBSCRIPTIONS CLIMB.—The March issue of Soil Conservation Magazine showed a net increase of 430 paid subscriptions over the February issue. Every new subscription means one more *informed* person, makes it just that much easier to get soil conservation out on the land where it belongs.

DISTRICT ACHIEVEMENTS IN THE SOUTHWEST



BACKS FAITH WITH FUNDS.—Farmers cooperating with the Santa Cruz Soil Conservation District spent more than \$100,000 on soil and water-conservation work during 1947, according to W. G. Williams, work unit conservationist of the Soil Conservation Service stationed at Nogales, Ariz.

The largest and most beneficial practice was land leveling, Williams said. A total of 792 acres, representing one-tenth of the total area of Santa Cruz County, was leveled at an approximate cost of \$70,000 to the farmers. Approximately 60 percent of this was new land which had to be cleared of dense brush prior to leveling, which cost an additional estimated \$17,000.

About 100,000 cubic yards of dirt was moved in the construction of diversion dikes and flood channels at an approximate cost of \$15,000. Additional projects boosted the total 1947 expenditures on soil and water conservation practices to more than \$100,000.

WHOLE COMMUNITY TO PROFIT.—Productivity of farms in the East Salt Lake Soil Conservation District was increased from 25 to 50 percent during 1947 as a result of the widespread use of soil and water conservation practices, according to A. R. Bowthorpe, chairman of the board of supervisors.

Land leveling in the district, which includes lands in Salt Lake County east of the Jordan River between Draper and Salt Lake City, increased 25 percent over 1946, and hundreds of acres of nonproductive lands were reconditioned by modern irrigation and drainage methods, Bowthorpe said.

The approximate cost of leveling lands during 1947 was 15 cents a yard for dirt moved.

A fund of nearly \$4,000 was accumulated during the year, and the district supervisors now are considering using this to buy and recondition lands that now are nonproductive because of overfarming or too much water.

The supervisors feel that bringing such lands into profitable production not only will put them back on county tax rolls, but also will improve the economic status of the area considerably.

QUICK RETURNS FROM LEVELING.—The leveling of 31 acres, where irrigation was difficult, has resulted in increased crop yields which paid the cost of the work and showed a \$700 profit for the owner, Charles Auckland of Olney Springs, Colo., in a single year.

Auckland, who is cooperating with the West Otero Soil Conservation District, applied to the district supervisors for assistance in 1946. Distribution of water on two adjacent fields on Auckland's farm was poor. Some portions were not getting enough water, while ponds were forming lower down.

Technicians drew up a complete soil and water conservation plan which called for combining the fields, leveling the land, removing the old dikes, and constructing a new irrigation system.

Leveling of the 31 acres in the two fields cost \$1,800 because of the long hauls that had to be made with the carry-all. However, Auckland's high expense was more than offset when the 1947 crops were harvested. The land is farmed by a tenant, and Auckland's share from the 1947 crops totaled \$2,500, or \$700 more than the entire cost of the improvements.

In addition, Auckland reports that 30 percent less water was needed for irrigating in 1947, and much better crops were produced than formerly. The labor cost of irrigating was reduced 50 percent after leveling, and Auckland is convinced that this more efficient use of water will reduce the hazard of a high water table which is prevalent in Crowley County.

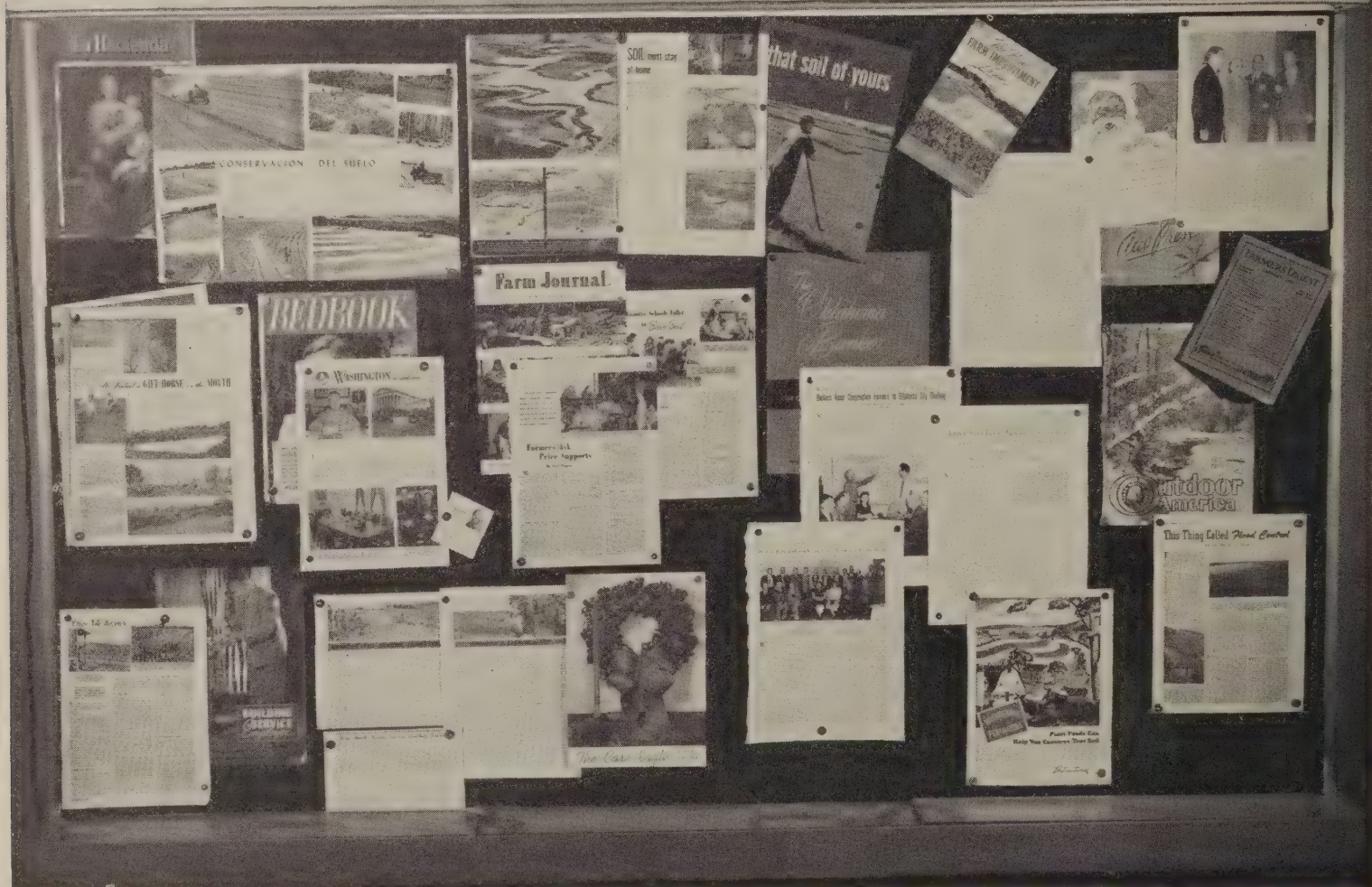
COMPARISON.—The value of proper irrigation practices has been clearly demonstrated on the farm of Leo and Harry White, who operate a dairy and do irrigation farming near Tucumcari, N. Mex.

In March 1947 the White brothers called upon the Canadian River Soil Conservation District for assistance in leveling a 19-acre field, and Soil Conservation Service engineers furnished the necessary technical assistance. The cost of leveling and bordering was approximately \$30 per acre, the field presenting one of the most difficult lay-outs made here to date, with bends in parts of the borders and irrigation runs in several directions. However, the borders were kept parallel and farming operations haven't been so difficult, according to the brothers. Alfalfa was planted on the 19 acres this fall and is up to a good stand.

At the same time the brothers planted 5 acres of irrigated pasture on sloping land with seed costing \$10 per acre. They failed to get a stand because the tract could not be properly watered. The brothers now have called upon the district for assistance in leveling this tract.

FRIEND TO FRIEND.—One good turn deserves another. Have you mentioned to a friend on farm, in bank or school, that small nugget of useful information you picked up from Soil Conservation Magazine?

SOIL CONSERVATION SERVICE



BULLETIN BOARDS.—From coast to coast people are talking soil conservation. Chambers of commerce, bankers associations, school groups, luncheon clubs, women's organizations are awakening to the importance of taking care of the land. The extent of interest in the subject is reflected daily in a vast variety of published magazine articles, bulletins, and newspaper stories.

To extend the usefulness of such publications, attractive bulletin boards are being used in many places as a service to the passerby. They're found in offices of district conservationists, at headquarters of soil conserva-

tion district supervisors, in the rooms of county agents, in the corridors of agricultural colleges and courthouses. Such bulletin boards, kept current and carefully managed, can be of great help to a community in acquainting the people with what is happening out on the land.

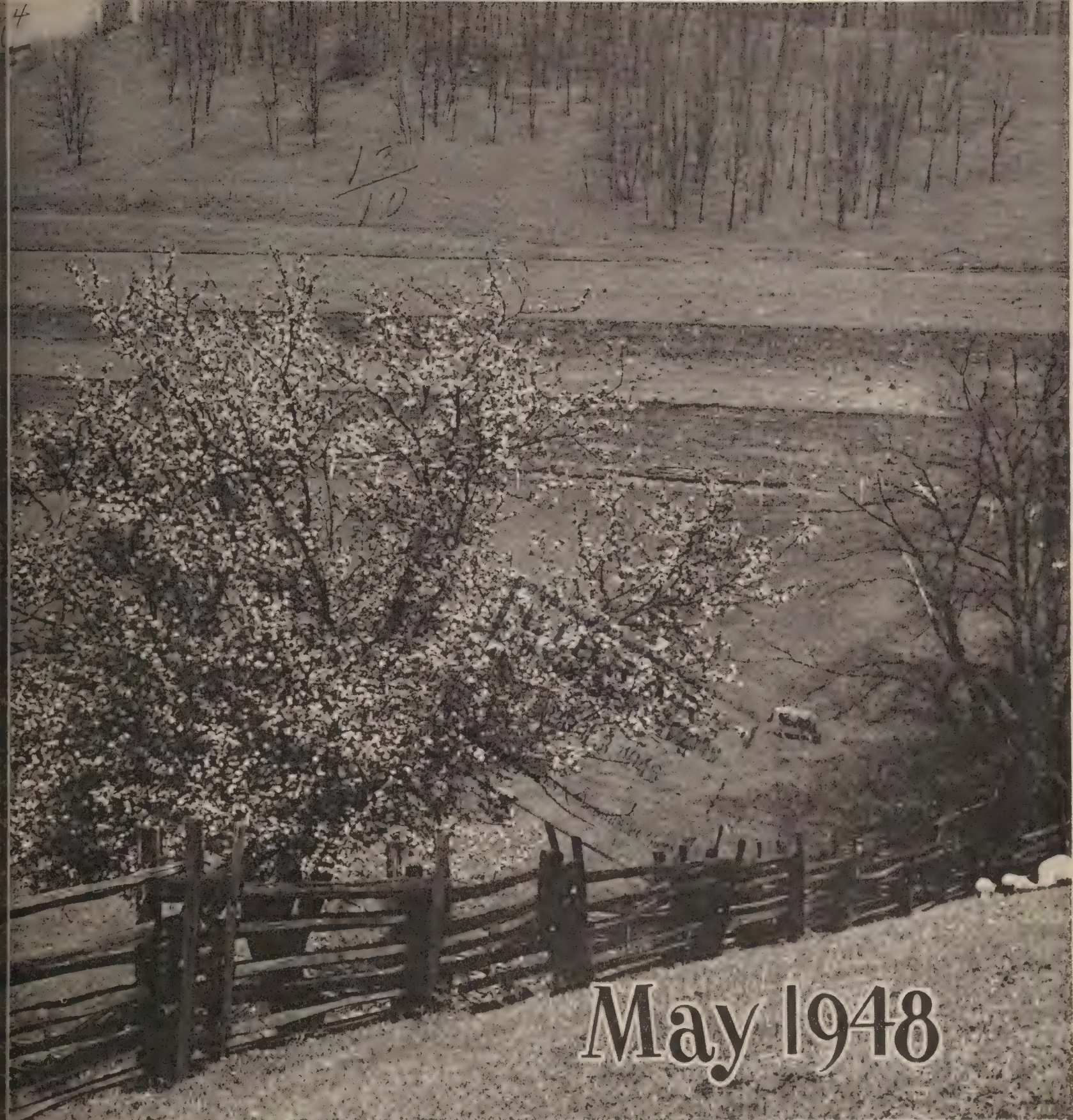
The picture above is of the bulletin board outside the office of Hugh Bennett, Chief of the Soil Conservation Service, in Washington. The clippings never stay on this board very long; there are too many others waiting for their chance to be put on brief display.

RANCH RESTORED.—H. D. Cornell operates the 75,000-acre Bar-C Ranch in the Davis Mountains 6 miles south of Kent in west Texas. When he signed an agreement with the Toyah-Limpia Soil Conservation District in the summer of 1945 to apply a coordinated conservation program to his ranch, "the vegetation was bad and getting worse rapidly, the land was badly gullied and the water supply was poor," said Cornell. Under the conservation program, parts of the ranch have already been restored to excellent range condition, other parts to good or fair condition. Cows have a 92 percent calf crop and calves average 550 pounds at 10 months when they are marketed.

MAP-MAKING AWARD TO KELSH.—Harry T. Kelsh, in charge of field mapping for the Soil Conservation Service received a top award for his contribution to aerial map-making recently.

The award was presented by the American Society of Photogrammetry in Washington. Approximately 900 map experts attended the society's convention.

Kelsh received the Sherman Fairchild Photogrammetric award for research on an instrument to maintain the simplicity of a projection system in compilation of maps from aerial photographs.



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CLINTON P. ANDERSON
SECRETARY OF AGRICULTURE

HUGH H. BENNETT
CHIEF, SOIL CONSERVATION SERVICE

ISSUED BY SOIL CONSERVATION SERVICE, U. S. DEPARTMENT OF AGRICULTURE
WASHINGTON, D. C.



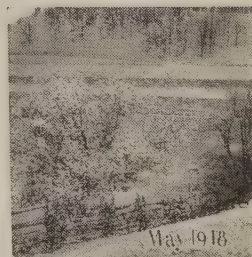
POULTRY ON CONTOUR.—"We own three farms, of 281 acres, on which we raise about 5,000 White Leghorn pullets each year and keep from 7,000 to 8,000 breeders," writes John Bender, of the York (Pa.) Soil Conservation District. "We generally follow a 3-year rotation, consisting of corn, wheat, and hay. Occasionally, we grow corn or wheat another year on some of the land which is not steep.

This year we had the strips in grass which we used for ranges for the young stock. We generally use about four of the strips for ranging the pullets. We start out with all of the chicks on one strip, and as they get larger we move the range houses along to several strips. We find this convenient when hauling feed and water to them. In all cases our pullets are on grass strips which are adjacent to corn strips. The corn furnishes plenty of shade. The conservation program has made these shade facilities possible. If it were not for these, all of the broods would be too close together. In fact, we would not know how to handle them without the strips. We save almost one-third on feed by having the young broods on range. The vitality of the broods is better and mortality much lower. In 1947 we had 1,000 cockerels on range. These were all dubbed and the losses were extremely light.

"The conservation program on the farm which I recently sold increased crop production over 50 percent on the eroded hill land over a period of a few years. I can raise a great deal more feed under this system, and I would not farm if I could not farm on the contour. This farm consisted

(Continued on page 220)

FRONT COVER.—Spring plowing for strip cropping on farm of Shelby Adams, Limestone Mountain, Tucker County, W. Va.; corn and grass strips to be used in the usual rotation. Photo taken in May 1947 by Hermann Postlethwaite.



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WELLINGTON BRINK

Editor

Art Work by

W. HOWARD MARTIN

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business, with approval of the Director of the Budget. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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Modern chuck wagon designed by Mrs. Doherty for use during round-ups. She stands at right. The others are her son and her father.

Round-up of cows and calves in fall of 1947. In furthering her conservation program Mrs. Doherty has built five new stock ponds, developed wells and springs, constructed new fences for better distribution of grazing, and now plans to reseed several areas.



She Ranches *With a* Map

POSSESSED of grit, determination, and a quick readiness to learn, Mrs. Joseph L. ("Tiny") Doherty finds that being small of stature and a woman is no handicap to the successful management and operation of her 30,000-acre ranch near Tobe, Colo., in the Branson-Trinchera Soil Conservation District.

Although she was born and raised on a ranch in northeastern New Mexico, Mrs. Doherty never had to make decisions involving management of a large cattle outfit prior to the sudden death of her husband, Joseph L. ("Little Joe") Doherty, about 3 years ago. Left with two small children, and the big ranch in Las Animas County, Mrs. Doherty hesitated only briefly in debating the course to

pursue after her bereavement. In the best traditions of the West, she decided to carry on.

Shortly thereafter, she made an application for assistance to the supervisors of the Branson-Trinchera Soil Conservation District. A service which Mrs. Doherty found especially useful in familiarizing herself with her large holdings, and with some of the practical management problems, was the aerial land-use map of the ranch prepared by Soil Conservation Service technicians. Where did she need to develop additional stock water? Where could she build fences most profitably and economically? What pastures should be subdivided or enlarged? What portions of the ranch ought to be reseeded? How could she improve grass production and increase the weights of cows and calves by a systematic rotation of grazing?

Decisions were reached, plans worked out, and "Tiny" entered into a cooperative agreement with the district. As a result five new stock ponds have been built, several wells and springs developed, new cross-fences constructed. Prairie dogs have been killed out. Plans have been made for re-seeding several old fields of low production.

With the knowledge gained in working out the conservation program, and the loyal services of her ranch foremen, Juan Garcia and Ross Carroll, "Tiny" Doherty is rapidly building up a self-con-

fidence to match her personal pleasure at being in the saddle. While she maintains a home in town so that her children can be near a school, she spends an increasing share of time on the ranch, riding and taking an active part in operations.

"Tiny" designed and superintended construction of a modern "chuck wagon," first put to use in last fall's big round-up—another indication of her ingenuity and determination to keep her ranch up with the best of them in an area where fine cattle ranchers are numerous.

A BLOTTER FOR THE PELICAN STATE



This unwanted pond on the J. W. Carpenter plantation near Tallulah, La., is to be drained under a conservation program which the East Carroll-Madison Soil Conservation District has helped to develop.

By H. B. Martin

THERE are probably more good unproductive acres of farmland in Louisiana than in any other State—"unproductive" principally because they lack adequate drainage. Proper farm drainage is a need over a part of Louisiana. The Soil Conservation Service has found at least 6,768,000 wet acres in the State that can be put in full production if they are drained right. That land is scattered in farms big and little along the Mississippi, the Red, the Atchafalaya, and a dozen other rivers and bayous. Much of that land is alluvial, some of the best soil in the world. It is located where climate is mild, rainfall plentiful. Bumper yields of cotton, sugarcane, corn, rice, and forage crops may be had if there is good drainage, and if soil fertility is maintained.

NOTE.—The author is State conservationist, Soil Conservation Service Alexandria, La.

For several generations Louisiana farmers, lured by the promise of highly rewarding crop yields, have been laying cash on the line trying to drain their wet acres. They have invested a good many million dollars. Sometimes they have bought complete drainage. More often their ditches eliminated only part of the water. Improper ditch design, lack of good outlets, and poor maintenance have plagued them.

Drainage does not confine itself to property lines. In planning drainage systems it is necessary that the over-all situation be taken into consideration. In Louisiana there appears to be a perfect set-up to achieve proper drainage over all our lands in the State.

The U. S. Army Corps of Engineers, carries the responsibility for keeping the navigable and seminavigable waterways open. The Louisiana Department of Public Works, in cooperation with parish police juries, is doing a vital job in con-

structing parish-wide drainage systems so essential for providing outlets for farm drainage.

The soil conservation districts make their contribution, with technical assistance from the Soil Conservation Service, by giving assistance to farmers in planning and applying complete farm drainage programs. In a great many instances it is impossible to apply a satisfactory drainage plan to a farm or group of farms because there is no satisfactory outlet. The soil conservation districts do drainage only on farms that have such outlets. A drainage system wastes money if it can't entice water off the land, and it does not take an engineer to figure out that water can't flow away if there is no adequate outlet.

The work being done by the Department of Public Works in cooperation with the governing groups in a number of parishes will provide outlets where many thousands of farms can dump their water. If there is anyone who doubts that a complete drainage system will increase crop yields, they should talk with farmers who have had satisfactory drainage systems installed on



A dragline at work on the J. M. McLemore farm at Alexandria, La. SCS technicians assigned to the Lower West Red River Soil Conservation District staked out lines and helped McLemore develop a coordinated conservation program.



A field hand on the Wemple Plantation at Cheneyville, La., mows a drainage ditch. Maintenance of drainage structures to keep them from clogging is a necessity in Louisiana, where abundant rainfall and a warm climate result in lush plant growth.



The Fenris Conservation Group of the Grand Coteau Soil Conservation District is putting in this main drainage ditch to carry excess water off 247 acres. This ditch empties into Bayou Des Cannes. The town of Ville Platte is close by.

their lands. L. W. DeKeyser, manager of the Central Louisiana State Hospital Farm at Alexandria, recently said that 80 of the farm's 320

acres have been put into row crops as a result of conservation drainage. Corn yields there have risen from 27 barrels per acre before drainage to 39 barrels now. Sweetpotatoes made 160 bushels per acre in 1946; in 1947 with drainage, the yield was 225 bushels.

H. Philip Wemple, of the Lower West Red River Soil Conservation District, finds that drainage has given him 140 more acres in row crops. He says that the spring of 1947 was so wet at his 2,400-acre plantation that he would have lost his corn crop entirely had he been operating with the old ditches.

There probably is no one practice so important to the agricultural program in Louisiana as drainage—but drainage must be done correctly to be effective.



Some Economic Aspects *of Soil Conservation*

By NORRIS J. ANDERSON

WE ARE LIVING in an age of great and challenging problems. Ward Sheppard in "Food or Famine: The Challenge of Erosion" states it as follows:

"Man has failed to master either of his (two) main jobs: Making peace with his fellowmen, and making peace with nature. Both failures stem from the same cardinal sin, the sin of exploitation. Cooperation and mutuality constitute the key to success in both cases. Peace with nature is of the same urgency as peace among men. Modern man has perfected two devices, either of

which is capable of annihilating civilization. One is total war; the other is wasteful and destructive uses of resources, including soil. Actually these devices go hand in hand."¹

The presence of problems is not new in American history. Problems are as old as history itself. The inclination of the average citizen to be complacent and passive about some problems provides some justification for concern.

This nation's land policy has always been characterized by a liberal allocation of responsibility to individual land owners and land users. Freedom of choice is a highly cherished American right. Freedom has been defined as "the opportunity to choose the right course of action." The freedom to use land as he sees fit places a large responsibility upon the individual. Freedom of choice must be accompanied by a recognition of

¹ Food or Famine: The Challenge of Erosion, by Ward Sheppard, p. 3.

NOTE.—The author is associate professor of agricultural economics, Kansas State College, Manhattan, Kans.

the responsibilities which accompany that freedom. If freedom is to be retained, the right course of action must be determined in terms of the proper relationship between rights and responsibilities.

All types of production depend basically on three factors, namely, land, labor, and capital. All three factors are highly essential. Labor and capital have increased in quantity down through the years, and can be further increased. In fact, at times unemployment has been a major problem; at times concern has been expressed over the possibility of having too much idle capital. Land, alone, is relatively fixed in quantity. Land resources, therefore, must be conserved with vigor and determination.

A surprisingly small portion of the earth's surface is arable land. This small amount of arable land provides a distinct occasion for giving more attention to conservation. Indeed, more attention focused upon the need for conservation is not only desirable but exceedingly necessary.

Americans who have traveled abroad, throughout Europe, the Balkans, and the Far East, have been profoundly impressed by the actual and potential dependence of war-torn nations upon outside sources for food and other materials. There is possibility of a prolonged dependence on the western hemisphere. The prolonged demand for food may be so strong that conservation of agricultural resources has become a major problem sooner than would have been the case had it not been for the recent war.

Secretary of Agriculture Anderson has expressed the belief that "today, more than ever, United States production is a key factor in world recovery. But, if this Nation is to provide a good share of the food so desperately needed by hungry people abroad, it will mean an inevitably heavy drain on our already strained soil resources."

Dr. Walter Wilcox of the University of Wisconsin has called attention to the impact of World War II on prewar food production patterns of the world. The 1935-39 pattern, Dr. Wilcox says, was approximately as follows:

Percent of world's total food supply produced by each continent

Asia	49
Continental Europe and North Africa.....	19
North America.....	12
South America.....	9
British Southern Dominions.....	2
British Isles.....	1
U. S. S. R. and others.....	8
Total.....	100

It is significant that North America, a continent which in 1935-39 produced only 12 percent of the total world food supply, is now expected to carry a much heavier load than formerly.²

The possibility of a growing strain upon food supply is not a new idea. Nor is it solely a consequence of war. The situation has been stated clearly by Ward Sheppard:

"The cold modern fact is that population is catching up with the potential food supply. There are no new continents to exploit. The virgin soil that can still be brought under the plow is only a small fraction of what is already in use."¹

Recurring wars, prompted by a never-ending struggle for resources, are evidence in support of the belief that in many regions of the world, population presses hard on food supply.

The time has come for a universal appreciation of the size of the problem and the urgency of the need for conservation.

The long-run need for conservation is seldom questioned. The more immediate, or close-up, advantages, strangely enough, are not so apparent. Fortunately, conservation farming can be profitable. Reports concerning satisfactory returns obtained from land on which conservation practices are in use come from various parts of the Nation. From Wisconsin comes the report that "grassland farming can be profitable.

"Measurements of yields have been made since 1940 on a 3-year rotation of corn, spring grain, and 1 year of clover-timothy hay. These have been compared with those on similar soils on which a 5-year rotation of corn, grain and 3 years of alfalfa-brome have been conducted. The 5-year rotations produced yields sufficiently large to gain the advantage."³

From Iowa, too, comes word that conservation farming is profitable.

"Costs and net returns on nearly all grassland farms have been compared with the costs and returns on corn-hog-dairy farms of similar size and soil quality."⁴

Gross annual income was lower on the grassland farms, but the operating expenses were lower yet, leaving a slightly higher net income on the all-grassland farms.

² The Farmer and the Second World War by Wilcox, p. 321. Iowa State College press.

³ Wisconsin Agricultural Experiment Station, Bull. 468, December 1945.

⁴ Forage Notes, Iowa State College, Vol. 1, No. 6, 1946.

In Illinois, a study of economic aspects of soil conservation has been made, with the following results:

"Conservation farming increased crop yields from 9 to 21 percent in the six areas studied. Higher yields and the larger acreages of better pastures caused the high-conservation farms to produce more total digestible nutrients. Thus, higher livestock production standards resulted on such farms than on the low-conservation farms. Even at 1935-39 prices the earnings on a 160-acre high-conservation farm would have exceeded earnings on a low-conservation farm by a substantial figure."⁵

A study of production records on high and low conservation farms in Kansas substantiates the results obtained in other states. On 39 high-conservation farms the average yield of corn per acre was 41.2 bushels; on 42 farms with less rigorous conservation practices applied the average yield is 29 bushels. Wheat yields ranged higher on the high-conservation farms by 18 percent. Obviously, the value of livestock in dollars per acre was higher in the case of farms on which conservation practices were diligently applied.

For the period ahead a balanced farming program, including adequate provision for livestock, will pay dividends. The Inter-bureau Committee on Postwar Programs (U. S. D. A.), working in cooperation with the Land-Grant Colleges in 1945, made a study of desirable peacetime adjustments in agriculture. "Bench marks" or desirable and attainable goals, were prescribed. For the postwar period a bench mark in gross farm production approximately one-third greater than the prewar average was recommended. For certain products the desired goal was set at levels higher than one-third above prewar levels.⁶ For instance:

(1935-39-100)	Bench marks
Feed grains and hay-----	146
Food grains-----	120
Dairy products-----	142
Meat animals-----	155
All livestock products-----	137

In line with these recommendations, the Inter-bureau Committee recommended that "... 19,000,000 acres be added to the 73,500,000 (acres) of hay and rotation pasture. The resulting 92,500,000

acres would occupy 22 percent of the Nation's cropland."

The long-range estimates of what would be required of agriculture were based on (1) probable postwar population increases, and (2) assumed foreign demand, both of which have exceeded expectations. One of the interesting aspects of the bench marks is that they now appear to have been conservative.

The livestock outlook in relation to the prospects for a profitable use of more grassland may be viewed from several angles, with much the same results. Since 1915 meat prices have steadily improved their position in relation to wholesale prices of all other commodities.

There are substantial reasons for the improvement in the relative position of meat prices. (1) There are higher wage levels now, and an improved standard of living. (2) A related cause, increases in the total national income have strengthened the domestic market. (3) Improvement has occurred in processing and marketing of meat. Refrigeration and cold storage have stimulated the demand for meat the year around.

The most recent reports coming from the United States Department of Agriculture and other sources indicate that meat supplies are apt to fall far short of satisfying the demand for the next 3 to 5 years. Less meat will be available in 1948 than in 1947; still less in 1949. Reason: Each year since 1944 more beef has been consumed than produced. That implies, of course, that breeding stock has been reduced and the size of future calf crops will be correspondingly smaller.

With this favorable price outlook for livestock products, it would appear to be profitable to go much further in the substitution of higher yielding and higher quality feeds for lower yielding grass hays.

A CONTOUR FARMER NOW.—"We have been renting this farm for 18 years and always ran our cotton rows with the road in the front field," commented Murray Kelley, of near Huntersville, N. C., in the lower Catawba Soil Conservation District. "Since we made a soil conservation plan for the farm, with the help of Soil Conservation Service workers, we have terraced most of our land and use the terraces for guide rows. This year's cotton crop is more uniform than we have ever had on that front field and easier to work. My brother George and I bought a new 120-acre farm and the first thing we did was to make a plan with the soil conservation district. We are going to terrace our farm, follow a system of crop rotations, develop some improved pastures, and plant pines on the washed off land. From now on I'm a contour farmer."

⁵ Economics of Soil and Water Conservation, by Elmer L. Sauer (a Ph. D. thesis, 1947).

⁶ U. S. D. A. Miscellaneous Publication 595, *Peacetime Adjustments in Farming*.

TOP CHOICE OF INDIANA STUDENTS

By B. R. Bertramson

AT PURDUE UNIVERSITY a series of 10 lectures on general soil subjects was introduced in Agronomy 2, the last one-third of the course this year. The first two-thirds of the course dealt only with the crops side of agronomy. The soil subject had not been presented to these students before, since most of them were freshmen. Only the first two lectures were given before Christmas vacation. At the first lecture, the students were instructed that a term paper written by them would constitute one-half of their final grade from this portion of the course. They were given their choice of any of the 10 subjects which were covered in the lecture manual especially prepared for the course.

Since this was the first exposure of the group to these subjects, and the students would likely decide before returning from vacation just what subject they would select; it was considered that the number selecting each subject would be a fair measure of its popularity with agriculture students of freshmen level. The percentage of the 160 stu-

dents which wrote on each subject is listed below. The data indicate that these freshmen were quite soil conservation conscious. Even where they wrote on the other subjects, their approach was often with emphasis on soil conservation.

<i>Subject</i>	<i>Percent of class writing on subjects</i>
The Soil as a Natural Resource-----	5
Formation of Soils and Their Physical Properties-----	7
Water in Relation to Plant Growth----	
The Regulation of Water in Soils-----	5
The Conservation of Our Soil-----	51
Soil Organic Matter -----	13
Soil Acidity and Liming-----	8
Soil Fertility and Nutrient Element Bal- ance-----	4
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NOTE.—The author is soil chemist, Purdue University, Lafayette, Ind.

A BANKER LOOKS AT THE LAND

By Charles T. O'Neill

THE BANKER, perhaps, more than any other businessman is conscious of weaknesses that develop in the economic life of his community, and since agriculture is the largest business in our rural communities the country banker is naturally concerned about its progress and development.

The American Bankers Association, through its Agricultural Commission, has adopted as its Number One project again this year a campaign to encourage soil conservation practices. They have published, and are distributing to more than 12,000 country bankers that make up the membership of its Association, the booklet. "What Bankers Can Do About Soil Conservation." Such a program among our country bankers is for the purpose of stimulating them to the lead in their local communities, in cooperation with the agricultural

leaders, in arousing farmers to recognize the need for action at this time when they are in the best financial position they have been for many years.

Certainly no one expects conditions to remain so favorable for the farmer as they have been the past few years. Even with high prices the farmer's production costs are climbing higher and higher and soon will squeeze out most, if not all, margin of profit. Then will come a declining period in which the price of his commodities will drop faster than his operating costs, and he must be prepared to make prompt and important adjustments. He must then be fortified with an efficient operating plant producing two and three units of commodities where formerly one would grow.

As bankers we are naturally interested in increasing the income and wealth of the communities that we serve and we recognize that agriculture, perhaps more than any other business, must have a long range program of production and improvement if the farmer is to have any chance of permanent success.

NOTE.—The author is vice president of the National Bank and Trust Co., Charlottesville, Va., and chairman of the Agricultural Commission, American Bankers Association.

A complete conservation program will do much to bring this about, for I have personally seen farm after farm in my own community, as well as in many other parts of this land, double and treble production by protecting soil, conserving moisture and intelligently applying lime and fertilizer over a period of years under a well developed plan.

At present most farmers compute their production cost on an acre basis rather than on a commodity unit basis, whereas the thing that really counts is the cost per unit of a bushel of wheat or corn or beef rather than the cost per acre. I think very few of us realize the importance of water conservation and the extent to which it can be stored in the soil through proper practices.

Many do not realize that some experiments which have been conducted indicate that through proper soil practices on slopes the run-off of surface water can be reduced to less than one-tenth of the run-off on bare land. What would happen if we took the entire drainage area of a river and put into effect a 100 percent soil program? I would like to see it tried on some river basin, for I honestly believe if this were done before any dams were built we might find that we don't need the dams for flood control—certainly, we would not need nearly so many.

Some years ago the Federal Government developed a demonstration area in soil conservation on Ivy Creek in Albemarle County, Va., and some interesting and valuable observations have been made as a result of this demonstration.

Before the farms along this stream were put under soil-conservation programs the City of Charlottesville got practically all of its sand for construction purposes from sand beds on this creek—but now there is no sand available.

Formerly, when floods occurred in this area the water in Ivy Creek would overflow its bridges, yet a few years ago when we had the worst flood in 50 years the flood waters on this stream did not even reach its bridges.

We, as bankers, are also interested in the youth of our community. Since 1940 some 50,000 young men have left our farms in Virginia, or approximately 500 for each county in our State. Can our rural communities and farms afford to lose such a large percentage of its most promising youth? On the other hand, since the farms on Ivy Creek were put under soil-conservation programs, there is a decided increase in the number of sons, daughters, and sons-in-law remaining on these farms

and taking a great interest in farming the conservation way.

I have been asked on several occasions why bankers are so interested in the welfare of the farmers. I am forced to admit that ours is somewhat of a selfish interest.

In many communities agriculture is the principal business, and the growth and development of the bank, as well as the community itself, is largely dependent on the prosperity of those engaged in agricultural pursuits. Today, more than ever before in the history of our country, the future development of our rural communities is dependent upon the intelligent use of local capital created through the savings of local citizens. Agriculture has always been, and always will be, one of the basic industries of this country and local capital is necessary for its development.

There was a time when only a small amount of cash was required to go into the farming business, but today it requires considerable capital. To be a successful farmer, one must be a good business man and keep posted on business trends. With rapidly changing economic conditions both at home and abroad, the farmer must plan his operations in such a way that he can shift with changing conditions so as not to be caught with a large inventory of high-cost products in a declining market.

Farmers' problems are going to be related to other business and to changes in the economic life of our Nation, and no individual in any community should be in a better position to present the facts and give sound advice on these matters than the banker. It is his golden-opportunity to serve his community and to help guide its business life through an unsettled period following this war.

As bankers, we want to see agriculture self-supporting and not dependent on subsidies. This can only be done by having farms with diversified programs supported by good soil, modern equipment, and a plant so efficient that it can adjust its production to take advantage of changing conditions. Certainly, if we are going to extend credit for such purposes we want to see that our investment is well protected. We feel that this can best be done through proper conservation practices. Some experiments recently conducted at our Virginia Experiment Station indicate that a very large percent of commercial fertilizer, as well as the natural soil fertility, is lost through the water run-off and

soil erosion. These experiments were conducted on five different slopes under cultivation of corn, and measurements were taken on all run-off for water, soil and soil content.

It was found that the losses of nitrogen, potash and phosphorus, on 25 percent slopes amounted to 10 times as much as a corn crop takes out of the land. Such losses of soil fertility, if allowed to continue, cannot help but bring financial disaster to any farmer.

These losses, however, can be reduced to a small fraction where strip cultivation is used and sod holds back the run-off.

We need to study such matters, and ample funds should be available for research through our experimental stations.

Our national agricultural policy must include a constructive soil conservation program and procedures to assist farmers to adjust production to changing conditions, to assure abundant supplies of food and fiber for domestic and export needs, and to establish and maintain economic balances between agriculture and other segments of our national economy. Eventual destruction of our soil wealth, which would be followed by national disintegration, will be inevitable unless farm products can be traded on a fair exchange basis for the goods and services produced by other groups.

More and better equipment, and less labor, linked with a farm improvement program that will improve the soil and reduce the unit cost per acre is the only answer to the higher production costs of today. In addition to this, the farmer must be encouraged to produce these crops for which there is a ready and stable market. Farm communities must look forward to developing small processing plants within their territory that will process their agricultural products and manufacture their raw materials and natural resources into finished goods. It is in this conversion that the greatest profit lies. It not only makes a market for the raw products of the community but also gives employment to a large number of people and a greatly increased level of local income and wealth.

The maintenance of a sound agricultural economy is essential to the preservation of our American way of life. Agriculture, to survive, must avail itself of modern techniques parallel with those in industry.

The resources of this country consists largely of capital, labor, and natural resources—including soil. These resources are interdependent. If we are to continue to have an inexhaustible source for the creation of capital and wealth, we must protect and preserve our soil and natural resources. We, as bankers, can play an important part by helping to educate the citizens of every community to the need for protecting these capital resources.

YOUTH SPEAKS UP.—"Since I have taken more interest in the soils and land, I have noticed that Mother Nature is a hard working, modest woman," writes 16-year-old Earlyne Blackstone, of Caribou, Maine. "She works 24 hours a day and 7 days a week, where men now are complaining about working from 7 o'clock to 5. If men would work from 8 o'clock to 4 and do as she does they would be more successful.

"All of this was proved to me by two trips which I have taken this summer with my father. We took one in June and one in September.

"On the trip in June I noticed men plowing the ground, tearing Mother Nature's pretty dress all into tiny bits. Mother Nature was crying, causing streams to overflow. From where the water was running into the streams, tons of good Aroostook soil was being carried away. The Aroostook River was half mud, let alone the other rivers and streams.

"In September our trip was to the soil conservation experiment farm in Fort Fairfield, over to Presque Isle, and then around by Washburn and Caribou.

"On the soil conservation farm I noticed that they were using ideas which weren't practical, and which the average farmer cannot use to pay for a farm, pay taxes, and support a family. Of course, they were ideas which would show a farmer how to use the land, but the soil conservation men can tell them how to use it, or they can read how. They didn't even have a sign up or tell the public where the farm is located. Are they ashamed of what they are

doing? I think we are doing a better job on our farm than they are on theirs.

"As we drove through Presque Isle I couldn't help noticing how Mother Nature had mended her dress. The green grass, the hay, the golden wheat, were covering the gashes and tears which were showing last spring. The potato tops were high so that the washes in the field could not be seen. In a few words, she was in her Sunday best and fooling men.

"The main thing on this trip that I did not like was that we saw one of the soil supervisors using a diversion ditch for a field road, which was a poor example to the neighbors and others.

"The time to check your farm is when the heavy showers come. We were coming home from the fair late one night when we had a cloudburst. We drove directly to a waterway that we had built in the spring. Lime, fertilizer and manure had given the grass such a start that a stream of water about 6 feet wide and a foot deep did not gully or spoil the ditch, but we also found a weak spot in the ditch which we fixed the next day. We have found no weak spots or had any trouble since.

"We had already put contour furrows in the pasture trying to settle more silt from the neighboring farms.

"We had found that spreading old hay in the waterways quickens and gives a better catch of grass.

"We also have about all of the hill on contour with alternating strips of peas and potatoes. By doing this we are getting benefits from all of our land."



FOR SERVICE TO SOIL.—Bill Durham, regional editor of the Fort Worth Press, has been given a distinguished service award as one of Texas' five outstanding young men in 1947 by the State Junior Chamber of Commerce for his direction of a soil conservation program.

The honor was presented January 17 at a dinner in Fort Worth. Four other young Texans were also recognized for distinguished service. Durham was the only newspaperman in the group.

A native of Belton, Tex., a veteran, and a former reporter on the Temple, Telegram, Durham has been in charge of the State-wide soil conservation program for three years.

Sponsoring the soil-saving campaign are 20 business firms, the Fort Worth Press, Houston Press and El Paso Herald Post, the Texas soil conservation districts, and several Federal conservation organizations. Awards to farmers and ranchers in the 1948 program will total more than \$10,000. A similar amount was given in 1947.

(Continued from page 210)

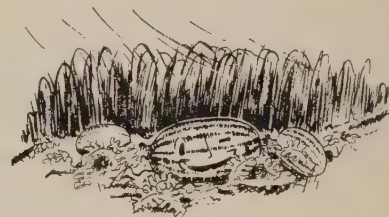
of 61 acres on which we carried 700 layers. The entire program was very helpful to me and I feel that almost all farmers in the York District could use this help.

"On the new farm which we have bought, we are putting in complete conservation work on every acre. We are planning on putting poultry on the strips above the diversions in ladino clover and use these for ranges for our pullets. I am sure that with good ranges we can save 20 percent on the feed cost and we will be able to raise a more rugged bird."

FARMING IS A PLEASURE.—"Last year I made nearly a bale of cotton to the acre, which is twice my normal yield. My corn and oat yields have doubled and I made 20 bushels of wheat per acre on land that I used to let lie idle," said W. K. Jordan, of Wrens, Ga., in commenting on the value of the soil conservation plan for his farm in the Jefferson County District. "The most important thing that has happened, though, is that I have gotten to the place where farming is a real pleasure to me, because I feel like I'm accomplishing something. Before I had a plan, I was discouraged and about ready to give up."

Readers! Supervisors! Cooperating Farmers! Please note: Short contributions such as those on the following pages are invited by Soil Conservation Magazine. A good idea may be helpful to another district, another farmer. Share your experiences!—Editor.

PACIFIC



MELONS AND RYE.—A. Whitman, farmer-member of the East Benton Soil Conservation District (Wash.), saved his melon crop by farming the "conservation way."

Whitman, following closely the farm conservation plan Soil Conservation Service technicians worked out with him, planted rye in strips across a field on his farm, at right angles to prevailing winds. Seeded in early spring the rye was high enough by the time the melon plants "broke" the ground to protect them from "sand blast."

The year before, without the windbreak, Whitman lost three melon plantings.

ONE CROP PAID FOR DITCH.—John Nelson, farmer of the Eastern Jefferson Soil Conservation District in northwestern Washington, is a believer in the power of conservation farming to produce money-making changes on lands. Says he, "I now have about 60 acres of my farm drained. One ditch, which Soil Conservation Service engineers helped me relocate, has been paid for by a single crop."

Nelson says it would have taken him a number of years to plan the changes needed on this farm without the aid of trained technicians.

DOUBLES FORAGE.—"My range conservation plan is paying dividends," says Clarence McBride, Eastern Klickitat (Wash.) Soil Conservation District stockman, who reports doubling his range forage by conservation.

McBride, operating a 25,000-acre livestock ranch, received help from range specialists of the Soil Conservation Service through the district. McBride has developed such practices as the standard three-pasture, winter-spring rotation; stock watering stations, fencing to control distribution of stock and reseeding of threadbare range land.

FAR-FLUNG PROGRESS IN NORTHWEST.—Farmer-conservationists in Wenatchee Valley's rich agricultural empire of north-central Washington have just ended their biggest year of pushing conservation measures on erosion-ridden orchard and grain lands.

Conservation farming is proving the touchstone for raising farm incomes of many fruit growers in the multi-million dollar Wenatchee Valley apple industry. The seven north-central Washington soil conservation districts report new and remarkable gains in the number of practices being applied to range, orchard and wheat lands.

In Douglas County, for example, soil conservation "erosion stoppers" carried out on Big Bend wheatlands, have turned the "grapes of wrath" outlook of the late twenties to a "bread basket" prosperity.

In Waterville-Mansfield plateau area, dry land wheat ranching calls for special soil conservation treatment.

High winds and spring run-offs are being overcome by use of crop residues and "trashy" fallow. Tillage methods that leave a protective cover of straw on the surface are proving a good buffer against "dusters" and snow melt.

Sprinkler irrigation is being used on more orchard acreage in the Wenatchee Valley today than ever before. Sprinkler spray, fanning out over fruit orchards, has been one of the real production changes in the apple capital.

Ranchers have welcomed the swing from rill irrigation to sprinklers. It has given them better use of water supplies. Erosion of orchard lands, a trait of the rill system, has been largely checked by sprinkler installations.

TIMBER CROP.—Technical help the Erfurth Bros., of Davenport, Wash., received from the Soil Conservation Service through the Davenport-Reardan Soil Conservation District helped them gain approximately \$2,500 from timber sales.

"I worked with the Service technicians and learned how a timber cruise is made," reports one of the brothers. "We found we had about 2 million board feet of timber to sell—much more than we expected. Tips from the Service farm woodland management specialists helped us draft a profit-making sales contract for disposal of our timber."

"OLD" ACRES REGAIN YOUTH.—Technical assistance received from the Soil Conservation Service through the Clark-Skamania (Wash.) Soil Conservation District is credited by J. Harvey Clark, of Camas, for putting a well-balanced soil conservation program on his farm.

He says, "I have 11 head of cows pastured on 8 acres of alta fescue and subterranean clover pasture mixture and in July 1947 I had plenty of good pasture.

"It's hard to believe my old weed-covered acres and poor crop of oats could produce so much feed in 2 to 3 years of conservation farming."

Clark, who is following his farm conservation plan to the letter, has limed all his farm and is using superphosphate at the time of legume-grass seedings. He is also developing a farm pond for livestock water and emergency irrigation for his peach orchard.

SOUTHWEST

CASH AND PLAQUE.—The Denver Post and radio station KLZ are sponsoring annual soil-conservation-recognition program, designed to increase interest among Colorado ranchers and farmers in better farming practices.

Cash awards totaling \$2,500 will be made in Statewide competition, according to Palmer Hoyt, editor and publisher of The Post, and Hugh B. Terry, KLZ manager.

"This program is undertaken because of the realization of both sponsors that the world situation requires constantly increasing food production and at the same time required measures to promote soil conservation in the United States, from which most of the increased production must come," a statement by Hoyt and Terry said.

The awards of \$2,500 will be made after an 8-month State and regional judging program. Nominations from each of Colorado's 75 soil-conservation districts will be received in the offices of either sponsoring organization until July 10, 1948.

For judging purposes, the State has been divided into 7 regions, each representing one of the State's larger watersheds. Regional judges will choose two districts from the districts nominated in each of the watershed regions. From the resulting total of 14 districts a State judging team will pick the top five in Colorado.

Each of the districts so chosen will be presented a cash award of \$500, in addition to a bronze plaque.

ANOTHER JOINS PARADE.—A Utah Soil Conservation Districts Association has been organized as a result of a State soil-conservation conference held at the State Agricultural College at Logan. The association will serve to coordinate the work of the district supervisors and will be affiliated with the national association.

E. S. Gardner of St. George, Washington County, has been elected president, Clyde Whitlock of Mayfield, Sanpete County, vice president, and N. O. Henrie of Panguitch, Garfield County, secretary-treasurer.

The association has been divided into five zones, taking in all counties of the State, with supervisors from each zone serving as a board of directors.

Utah now has 30 organized soil-conservation districts which include approximately 40 million acres.

HOW DISTRICT CAN HELP DISTRICT.—Cooperation and neighborly help is the policy of the supervisors of the Millard County Soil Conservation District with headquarters at Fillmore, Utah.

When the neighboring Beaver Soil Conservation District was organized a little more than a year ago, the supervisors had no funds with which to start work on the district, so here is what happened:

Supervisors of the Millard district met and decided to lend a helping hand to their neighbors. They purchased and made available to the Beaver district a new cement mixer, a new set of metal frames for making irrigation structures, a supply of cement and reinforcing steel, and a trailer. The new crew foreman for the Beaver district was trained with veteran workers in the Millard district. The Soil Conservation Service made a tractor available, so the Beaver district program got under way.

In 1 year's time the new district paid off the Millard district an amount of \$700—no interest, no notes—it was just good neighborly help.

Although the Millard district is only 4 years old, it owns a tractor and maintains full tractor operating and cement crews. It has its own complete shop to handle all repair work, and work is planned so that the operators are on a full year-long job.

OTHER DISTRICTS, ATTENTION!—Supervisors of the Prowers Soil Conservation District at Lamar, Colo., believe that their organization was first among the 75 districts in the State to own its own home—buildings for office space, car storage, and workshop.

The home ownership idea developed early in 1946 when it was practically impossible to employ operators for the district equipment because of the housing shortage in the area. The original idea was to build living quarters for an equipment operator and a small workshop. However, this plan has been dwarfed by the present outlay of buildings.

When city officials of Lamar learned of the district's need for a home, they donated a city block which had served as a gravel pit and dumping ground. The district supervisors immediately set about having the tract filled in, leveled, and partially landscaped.

Next, they purchased buildings through the War Assets Administration which had been used in connection with a Japanese Relocation Center at Granada, Colo. One of these was converted into a 20- by 50-foot workshop and storage space, and has been equipped with all tools and machinery needed in repairing the district-owned equipment. The other 25 by 108-foot building was remodeled to provide office space for the district, a meeting room, and two apartments. Soil Conservation Service personnel working with the district are housed in the office space. The meeting room is used for all types of gatherings interested in soil conservation. The apartments are rented to the district equipment operators.

However, the district supervisors are not through with developing their project. They plan to install an irrigation system and then finish the landscaping of the area. Then all available space will be used for demonstration plots of grasses, farmstead tree windbreaks and other conservation practices on a small scale.

FOR GREATER EFFICIENCY.—The New Mexico Association of Soil Conservation Districts, designed to include representatives from all 50 of the conservation districts in the state, was formed at a recent statewide meeting held at Las Vegas.

The decision to organize the association was made after representatives of the districts heard a talk by Kent Leavitt, president of the National Association of Soil Conservation Districts.

Lewis Schiele of Las Vegas was elected temporary chairman and instructed to draft proposed by-laws. Noel McDade, Clayton, was elected temporary vice-chairman, and Mrs. Evelyn Keithley, Serafina, was named temporary secretary-treasurer.

NORTHEAST

GULLIES WERE MULE DEEP.—"We had a conservation plan made for our farm by a Soil Conservation Service technician in the Carroll County District, Maryland, in the early summer of 1942," writes Charles L. Halter, who farms near Westminster, Md. This plan called for contour stripping of all of our crop fields, the relocation of fences on the contour, and an increase in the acreage of permanent pasture. In addition, the plan called for the liming and fertilizing of our pasture and an increase in the alfalfa acreage. At the time the plan was made we were carrying 18 cows and 150 to 200 hens. We previously had difficulty in raising enough feed for our livestock. Before we had the conservation plan, our farm was badly gullied and a number of these gullies were mule deep.

"We installed all of the conservation practices called for in the plan as quickly as we were able. In fact, most all of them were established a year from the time the plan was made.

"Since we have conservation practices on our farm, our corn yields are at least one-third greater. Our yield of silage corn is also about one-third more. Wheat yields have increased as much as those of corn. Our hay yields are considerably better and we have been able to get a much better stand. The pasture treatment, together with more and better hay, has cut the cost of feeding our cows.

"We are now carrying 26 cows and 700 to 800 layers. We raise about 800 pullets each year. In addition to carrying more cows, milk production has increased per cow, as a result of more and better hay and pasture.

"Prior to the time we had a conservation plan, we raised our pullets in confinement. We were unable to keep them on permanent pasture because every time it rained hard the water ran over the banks and drowned them. Since our cropland above the pasture has been strip cropped, we have noticed that the run-off during rainfalls has not been nearly so great and there is no danger of our pullets drowning from high water.

"There are 75 acres in our farm, of which 55 acres are in cropland, 14 in permanent pasture, 4 in woodland and 2 in home grounds. We do all of our work with a small tractor. We would have to use a larger tractor if we did not farm on the contour. I am certain that we use less fuel, and we can get more work accomplished in a day.

"A better management plan has resulted from the conservation program on our farm, and we would not change to the old method of farming under any condition."

ONE MORE ACRE PER DAY.—"We figure we can plow an extra acre each day on strips because we are working all the time, not wasting it turning on the ends," say W. E. and N. E. Brown, of the Lancaster (Pa.) Soil Conservation District. "And in the use of any farm equipment we can see a marked increase in efficiency and saving on upkeep. We would say, offhand, that the saving amounts to at least 8 to 10 percent."

ONE-FOURTH MORE.—"We have been using soil conservation practices on both our farms for seven years," writes Ross C. Ulrich, of the Lancaster (Pa.) Soil Conservation District. We are growing about one-fourth more general farm crops. When soil is conserved crops automatically increase. Increased crop production means more livestock, which in turn means more income and more manure for the soil.

"By strip farming we have found that machinery lasts longer and requires less fuel, because there are no gutters and you are farming on the level.

"We have had two dry seasons since we began practicing soil conservation and produced good crops both seasons, which, we believe, shows that good farming practices also help to conserve moisture."

LIVESTOCK HEALTH IMPROVES.—"With the range rotation which we are now following, we find that we do not have to dose for tape worms," comments Victor A. Zech, of the York (Pa.) Soil Conservation District. "The hay mixture which we use consists of ladino clover, red clover, alfalfa, and timothy. We generally use about one-quarter pound ladino clover to the acre.

"We are able to produce much more corn by following the conservation plan. Our hired man did not like the strips at first, but he would not want to work the fields any other way now that he has followed them. The conservation program has made it possible for us to do a much better job of farming, and has enabled us to reduce our costs, and maintain the health of our young stock. The conservation work advocated by the district will do much to help poultrymen and other farmers in York County."

NEW LOOK COMES TO OLD FARM.—"For nearly 100 years my farm was tilled in rectangular fields with the tillage generally up and down the slope which varied from 1 to 3 percent," writes Stanley B. Sutton, of the Kent (Md.) Soil Conservation District. "While this farm years ago was rated as a good one, the fertility had gone down until yields had reached a level that barely paid cost of production. Sheet erosion had taken most of the top soil and gullies in several places were too deep to till over. The soil is basically good; therefore, we decided to give it a chance to 'come back'.

"In 1938 we established two permanent pastures on the steeper slopes and put in contour strips for cultivation. We use a 3-year rotation of corn-small grain-hay, alternating crops so that no two adjacent strips are in the same crop the same year. The result has been that all of the lime, fertilizer, and manure has been retained, resulting in more than 100 percent increase in yields during the past 8 years. Our contour strips also conserve enough extra water so that in periods of drought our crops show no sign of suffering for a week or more after neighboring fields begin to burn. Our permanent pastures have been treated with contour pasture furrows, lime and phosphorus. Again, the contour furrows conserve enough extra water to keep grass growing when other fields are burned up.

"Our wild life plantings and woodlot management practices have also paid big dividends. A multiflora rose hedge planted in 1939 has replaced one permanent pasture fence. The other pasture fence has just been planted."

SOUTHEAST



District steps forward

MORE ACCOMPLISHED BY DISTRICT.—"I have taken an active part in many programs and enterprises that I thought would help my community, county, and state, but I am positive that more has been accomplished through our local soil conservation district than through all of the others," said R. H. Morgan, Fort Ogden, Fla., chairman of the board of supervisors of the Peace River Soil Conservation District. "I feel that the agricultural development of the area has been advanced 25 years since the organization of the district. I am sure that on my own place there has been a great deal of work completed that would never have been done had it not been for the fine cooperation and technical assistance of the Soil Conservation Service."

BLUE RIBBON IDEA.—The Kentucky Association of Soil Conservation Districts has distributed to chairmen of all districts in the state a supply of printed "Certificate of Membership" cards. Blanks are provided in which can be filled in the name of the district, name of the cooperating farmer, and the community in which he enrolls.

The State Association believes that the use of this card in the manner intended will bring farmers and their district closer together by causing all farmers to recognize the district as their organization, to which they *belong*, rather than as simply a source of technical assistance on soil and water conservation problems.

Through the addition of community chairmen to the district organization it is hoped that additional leadership for advancing the district program will be developed. Community organization provided for in the district membership plan should develop opportunities for group action, more equitable distribution of district facilities, and for expansion of district operations, the State Association believes.

Use of the membership card by individual districts, of course, is optional.

CREDIT RISKS.—"Before the Soil Conservation Service came along, our land was just simply washing away," commented W. E. Carpenter, president of the Merchants and Farmers Bank of Lineville, Ala. "We had never had anyone to go out to a farm and assist the farmer to make a complete conservation plan and then help him put it on the land. There is no question but that following a soil-conservation program makes a farmer a better credit risk. Our loans are usually production loans, but we could not afford to lend money for production on a farm that was washing away. It just would not produce. A farmer who follows a good conservation program not only

protects his land, but immediately begins to get better production. We don't make loans to those who are letting their land wash away and doing nothing about it."

NEW VIEWPOINT.—Wade Hadley, Sr., was skeptical about soil conservation work when it was first started in the Peaches Mill Community of Montgomery County, Tenn., where he lived. When his son, Wade, Jr., returned from service in the Air Corps, he got a job at the Clarksville Air Field about a half-mile from the Hadley farm. He observed that crops on the terraced and contour fields in the community looked better than on the other fields, and mentioned this to his father. It wasn't long before Hadley, Sr., applied to the Montgomery County Soil Conservation District for a complete conservation plan on his farm. The Hadleys now have an excellent soil conservation program, developed with assistance of the Soil Conservation Service.

YOU CAN'T FOOL A COW.—"Our soil conservation program has raised our standard of living—more corn, more small grain, and hay yields doubled," said Odell Sink, Rt. 1, Lexington, N. C. "When I take my wheat to the miller, he always remarks, 'That sure is pretty, plump wheat.' My cows appreciate conservation too. They graze the improved, limed and fertilized pasture down low before they touch the swamp grass, where before they grazed the swamp grass first. You can't fool a cow."

IT'S THE TRUTH, BROTHER.—The Rev. William E. Purcell, district supervisor of the Limestone Valley Soil Conservation District in Georgia, relates an interesting comment made by a neighbor whom he met on the road, as the neighbor was hauling a load of "guano" back into the hills to his farm, following a heavy rain. "Preacher," said the neighbor, "if we don't do something about erosion, hauling guano back up these hills is a big piece of foolishness. I met more fertility coming down the road that I ever will be able to haul back up."

SMALL WATERSHED IMPROVED.—"The small watershed of approximately 200 acres, of which my farm is a part, is about three-fourths protected by conservation practices involving three separate farms. A fourth farm has not been planned," relates Glenn Byerly, of Mt. Solon, Va., a cooperator in the Shenandoah Valley Soil Conservation District. "Since the three farms have been following the conservation program, there has hardly been any flood water running through the one drainage way that drains our farms. The water is held on the ground and moves off slowly, causing no damage. Before planning, the water concentrated in the drainage way, cutting the existing gully deeper and deeper. Most of the gully is now used as a meadow strip and produces good hay."

RIISING DIVIDENDS.—"I have had a soil conservation plan on my farm since July 1943," commented Paul H. Shivers, a cooperator in the Jefferson Davis Soil Conservation District in Mississippi. "I have improved my pasture until it is now carrying 27 head of cattle, where it formerly carried only 5, and the 27 are doing better than the 5 did before I had a soil conservation plan. As a result of following a definite rotation, I have increased by a third my yields of cotton and corn, as well as the other crops grown on the farm."

THE MOST IMPORTANT JOB.—"The Soil Conservation District movement represents the greatest opportunity farmers have ever had to work together in saving and building up their basic resource, the soil. Without such a movement, we face a declining agriculture," said Thomas T. Trawick, supervisor of the Orangeburg County District in South Carolina. "That's the reason I consider the job of district supervisor the most important job any farmer can hold for the betterment of agriculture."

HIGHLANDS HEREFORD FARM

Ely R. Callaway Owner
VISITORS WELCOME
IMPROVED PASTURES
KUDZU
HEREFORD CATTLE

CO OPERATING WITH SUPERVISORS OF PINE MOUNTAIN SOIL CONSERVATION DISTRICT

SIGN OF THE TIMES.—Ely R. Callaway, of LaGrange, Ga., paid \$4 per acre in 1936 for a 535-acre abandoned farm. Since that time he has spent \$75 per acre improving the land. With a 10 percent return on his money, he is well satisfied with the investment he has made.

Callaway, a relative of famed Cason Callaway, originator of the Georgia Better Farms idea, values so highly the soil conservation district plan that enabled him to build up this worn-out farm to a profit-making enterprise, that he has erected in view of the highway a large wooden sign with a picture of his land map painted on it.

"My neighbors said I was foolish when I paid \$4 per acre," Callaway says. "In 1940 I began trying to make the place into a livestock farm. I followed the best advice I could get in developing a pasture and establishing kudzu for emergency grazing. I battled along as best I could with little success and no profit. In 1943 I set 100 acres to kudzu. It made very unsuccessful growth for 2 years, although I had done everything I was advised to do by anyone I thought capable of advising me.

"In January 1945, I asked for assistance of the Pine Mountain Soil Conservation District. The local technician of the Soil Conservation Service worked out a definite plan with specific recommendations for developing the farm for livestock. I thought some of his suggestions were drastic, but I followed them to the letter. Now I see that he was sure of his ground.

"I now have 250 acres of pasture and 100 acres of kudzu grazing that are admitted to be as fine as any in the State. It has cost me close to \$75 per acre, but I am realizing 10 percent returns on this valuation and I am satisfied with my investment."

FORECLOSURE THREATENED.—Otis L. Smith, a returned war veteran, was discussing a plan for his farm in the Mobile River Soil Conservation District in Alabama with the Soil Conservation Service planning technician. Smith described one of his problems as follows:

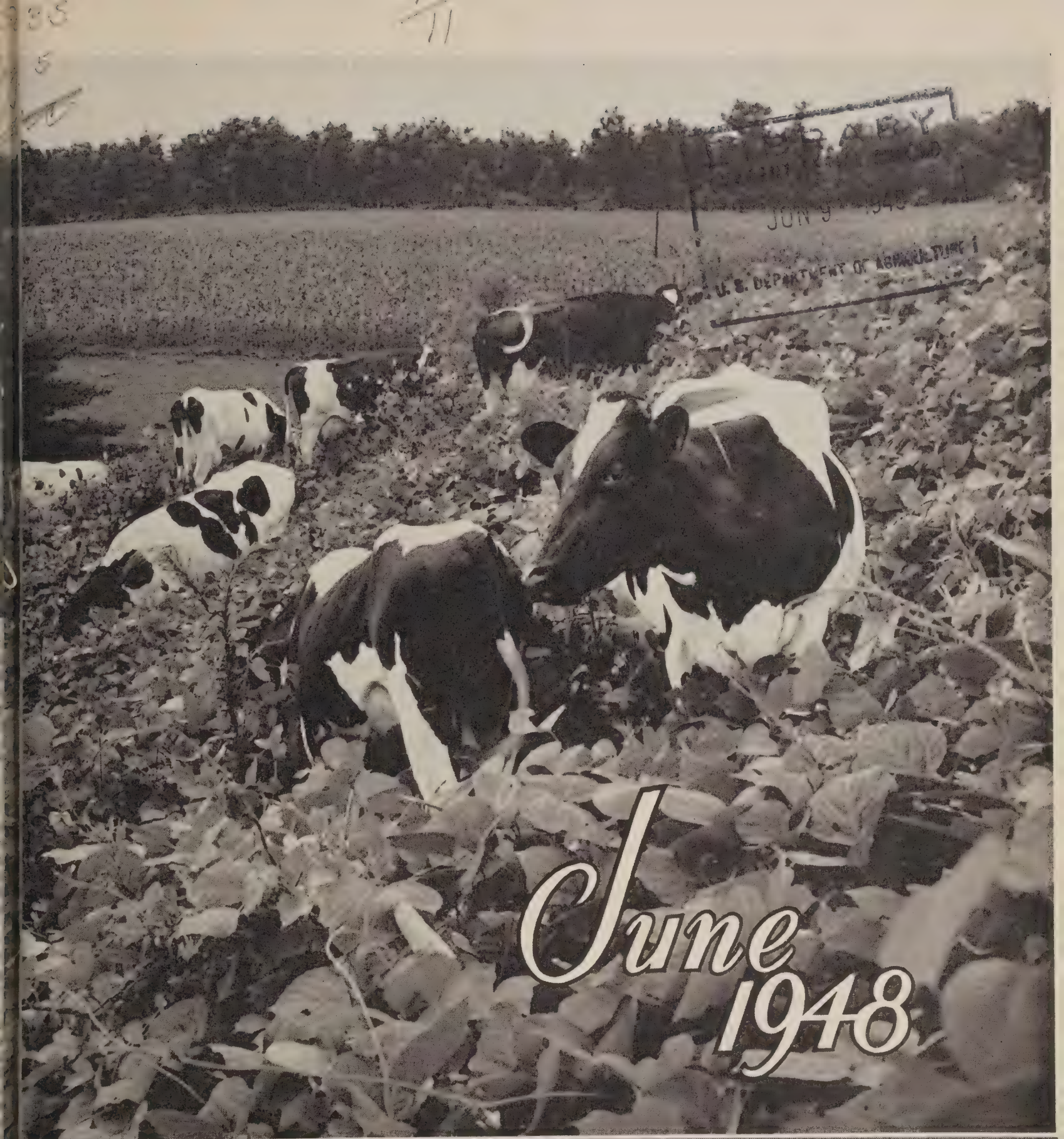
"The worst thing on the farm is a gully that has a mortgage on my barn. If I don't hurry up and get it stopped, it's going to foreclose on it."

ON THE LEVEL.—"I didn't realize how much easier it is to plow on the contour than up and down hill, until I did a job of custom plowing for a neighbor, who wanted his field plowed in the old way, without regard to slope," said Frank Miller, of Botetourt County, Va. "I plow my own fields on the level, and I found this up-and-down-hill plowing was an awful job. It took more fuel and in several places I had to raise my plow and plow shallower when going up hill."

WHERE EVERY ACRE COUNTS.—"As you travel State Highway 24 east out of Jacksonville, N. C., a few miles past the main gate of Camp LeJeune, you will notice a sign with the name, 'Kellum Town' painted on it," reports W. O. Lambeth, district conservationist of the Soil Conservation Service for the New River District, Raleigh, N. C. "It is a crudely painted sign, but to the 23 Negro families who live there, the settlement is the culmination of six long years of back-breaking toil. To William Hargett, recognized leader of the group it means another step upward in his plan for a higher standard of living for his people.

"Back in 1941, the Government condemned their land along the New River for the Camp LeJeune Marine Base. They finally bought 120 acres of poorly drained land and after many difficulties found lumber and materials for their homes. Some of them lived in 'brush arbors' all summer and fall. The new land had to be cleared, ditches dug, roads built, and farm buildings had to be constructed. But today they have homes with electric lights, a church, and a school on the 120 acres.

"The thing that impressed me about this project was the enthusiasm with which they went about improving their 4- to 10-acre farms. When I was discussing with them conservation plans for their farms, their leader said, 'With our acreage so small, we can't afford to have any idle land or land that produces half a crop. We need to drain our land and then to use it for whatever it is best suited. We want the Soil Conservation Service to tell us what to do, and we'll do it.'"



June
1948

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UNITED STATES DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

SOIL CONSERVATION.

CLINTON P. ANDERSON
SECRETARY OF AGRICULTURE

HUGH H. BENNETT
CHIEF, SOIL CONSERVATION SERVICE

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WELLINGTON BRINK

Editor

Art Work by

W. HOWARD MARTIN

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business, with approval of the Director of the Budget. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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WE GO TO PINE-TREE STATE.—Two districts in Maine are now sending Soil Conservation Magazine to all high school libraries and all vocational agriculture teachers within their bounds. To effect such coverage 20 subscriptions have been underwritten by the Kennebec County Soil Conservation District; Wesley Norton, chairman. Twenty-three subscriptions have been paid for by the Knox-Lincoln Soil Conservation District; Ray Thurston, chairman.



WOODLAND PROFITS.—Jake Woofter, who lives near Weston in Lewis County, W. Va., harvested \$10,000 worth of timber during 1946 from his 40-acre woodlot. He insisted in his contract that loggers could take only trees above 22 inches in diameter. He also made loggers take special care not to damage the remaining trees.

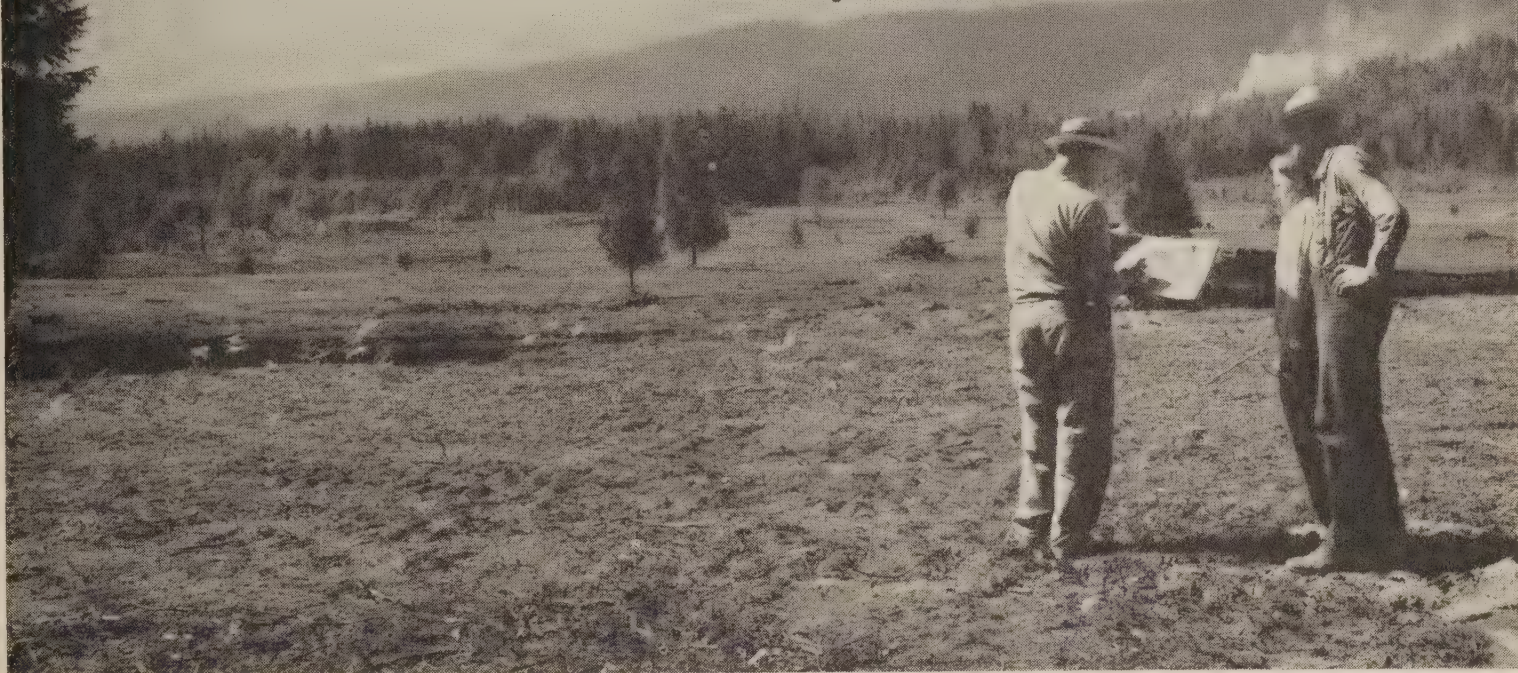
"Don't let anybody tell you a farm woodlot can't pay its way," said Mr. Woofter. "It just takes a little care and planning."



THE COVER.—This kudzu planted in gullies on farm near Rocky Mount, Va., quickly spread over two acres of steep, rough land. Owner's Holsteins thrive. Photograph by Orin S. Welch.

FRONTIER RANCHING

where the Skagit Flows



The 1948 model P & O Ranch will be a showplace for conservation ranching practices. Austin B. Summers, left, work unit conservationist, explains details. The cleared land seen here will be seeded to range grasses.

By Herb Boddy

CUTTING THE PATTERN of a modern cattle ranch today is still pretty much a frontier undertaking to Harold Pierson and James Ovenell, co-owners and operators of the new P. & O. Hereford ranch, near Concrete in northwest Washington.

The two Mt. Vernon farmers are blasting and bulldozing around 455 acres of tall timber in the scenic, sportsmen's playground area of the Upper Skagit River country. Their land-clearing operations are preliminary to setting the stage for opening one of the biggest cattle ranches in Skagit County.

Townsfolk of Concrete, who would rather have a tenderloin at fork's end than a dozen juicy steaks in status quo, will have to get used to sniffing hun-

dreds of tender cuts "on the hoof" within rifle shot of city hall.

Ranchers Pierson and Ovenell are building their cattle enterprise on firm basis of soil conservation. They are taking no chances gambling with hit-or-miss ranching short-cuts. You don't run a 400-head, 732-acre ranch "by guess and by golly," they say.

Backdrop for the P. & O. rancho is the rustic, unchanging Skagit River vacationland. The meandering Skagit River and its steelheads pass the northern fringe of the range. Almost within shadow distance is high and mighty Mt. Baker. Close by, to the east, is Mt. Sauk. Add the surrounding evergreen forests and you have a ring-side picture of the setting for the Pierson and Ovenell operations.

When the cattlemen picked their ranch site in 1942, sage Skagit River backwoodsmen summed

NOTE.—The author is of the current information staff, Soil Conservation Service, Portland, Oreg.



Pattern for the ranch was cut from the scenic, tall-timbered Skagit River playground area, one of Washington's last farming frontiers.

up the enterprise with a pointed maxim. "They're biting off more than they can chew."

Last fall, as the framework of conservation ranching practices began shaping up, the outlook seemed bright that the P. & O. would score a production bull's-eye.

Pierson and Ovenell are cooperators of the Skagit Soil Conservation District. They are closely following the ranch conservation plan which the Soil Conservation Service worked out with them early in 1947. The plan shows the productive use to which each acre and parcel of land can best be put. The ranchers use it as a blueprint to measure the fat and lean crop expectancy of their soils.

The work of carving out stock range from heavily forested land will take a year or more. Three bulldozer operators are cleaning up after the stump-shooters. The bulldozers do their work in a split-fraction of the time required by record-busting pioneer ox teams. Nearly 300 acres of stump and forest land have already been cleared. Looking ahead, the P. & O. owners expect to clear another 180 acres of brush and stump acreage by year's end.

First Herefords to graze the seeded pastures will be a herd of 100 slated to be moved onto the range this spring. Rate of growth of forage grasses and legumes and the date the clearing job is completed will determine how soon the stock will be expanded to capacity. Four hundred beef cattle by 1950 is the goal.

Soil conservation practices figure largely in the building of the ranch. The handy, practical guide to better farming—"farm conservation plan"—is the same kind that members of other farmer-operated districts in Washington are using to tackle their land problems.

Both Pierson and Ovenell, a former Skagit county commissioner, are long-time advocates of soil conservation. Their farms, near Burlington, used modern tillage techniques before the Skagit District was organized in 1942.

"But," says Ovenell, "there were a great many things we didn't know about the new science of conservation farming. After we joined the district and got better acquainted with soil conservation, we found we had been doing only half the job.

"Now we are getting better crop yields, without damage to the soil, by farming the conservation way. The technicians recommended the practices necessary to get the best use out of our farming investment. Later we were given technical aid to apply these practices effectively."

By glancing at the conservation plan outlined for their cattle ranch, Pierson and Ovenell can tell quickly the next step to take. Each operation stems from the plan.

Eventually, the entire 732-acre ranch will be seeded to pasture mixtures. Some 136 acres of bottomland were seeded to a flax "nurse crop" last spring. Flax, harvested this fall as a "cash crop," will be plowed under and the field will be in perma-

nent grasses and legume pasture. A second 31-acre field has been seeded to serve as an upland permanent pasture.

Some of the range is rocky, with a thin topsoil mantle. Other soils vary from rich to mediocre. Finding the best pasture mixture to fit each type of soil is a problem that Pierson and Ovenell will work out by sample seedings. Plantings of different mixtures of grasses and legumes are seeded side by side to determine the one best suited to each field. The sample seedings are preliminary to putting the acreage under a permanent grass-type

agriculture next year.

Pierson and Ovenell plan to divide their ranch into 40-acre fields in order to practice rotation grazing. Under this method, a pasture is given a period to renew its growth, before it is again used as forage. They will use surplus pasture grasses as silage to feed their cattle when forage is scarce in fall and winter.

The prospects of a winter feed shortage don't worry them. If there should be a drought "up river," they'll winter their stock on the lush feed available on their farms north of Burlington.



Pierson and Ovenell cashed in on a 136-acre flax crop seeded during the spring of 1947 as a nurse crop. Flax being cut here was planted with a companion clover and grass mixture for permanent pasture.

MAKE "BIG MUDDY" BEHAVE

BY GEORGE B. GERMAN

NEVER HAVE I had the necessity of saving our soil brought home to me more thoroughly and clearly than on a recent trip from Yankton, S. Dak., down into northwest Missouri.

NOTE.—The author is the "inquiring farm reporter" with WNAX, Cowles Broadcasting Co., Sioux City, Iowa.

In Yankton, from our WNAX offices, we can look out the south windows and watch the Missouri waters go rolling by. Winter or summer, it is rather an attractive scene, especially so in the early spring when the ice breaks up, and you see tons and

(Continued on page 244)



Aerial view of home plant.

DISTRICT PROFILE

GUY A.
LEADER

Poultryman

BY JOHN W. BARNARD

THE COUNTRY schools lost a capable young teacher and the poultry industry gained one of its outstanding breeders when illness, back in 1911, forced Guy A. Leader, of near York, Pa., to quit the classroom for outdoor work.

He chose chicken farming. From a beginning of 6 acres, 67 chickens, and less than \$200 capital, Leader pyramided to ownership of four farms, totaling 600 acres, and a national reputation as a White Leghorn breeder. He now has about 14,000 breeders and raises more than 18,000 head of young stock a year. Seven hundred thousand chicks are hatched yearly—all of them from eggs laid on the Leader farms.

The home farm, or home plant, as Leader calls it, south of York on the Baltimore Road, is a mecca for summer poultry tourists, not only because of the attractive appearance of the buildings and surroundings, but because of the proprietor's reputa-

tion as a master poultryman in the east to vaccinate against fowl pox. He was one of the first to use cod liver oil in rations. He has made many contributions to better poultry nutrition. In egg-laying contests in the east his flocks have placed at or near the top many times. In the 1945-46 contests he had the high pen for all the official standard egg-laying contests.

Leader was one of the first cooperators with the Soil Conservation Service in York County, in the CCC demonstration program in 1935. All the land in his farms is now being operated under plans prepared by SCS technicians working with the York Soil Conservation District. Practices being carried out on the Leader farms are contour strip cropping, crop residue management, cover cropping, sod waterways, pasture improvement, fencing, woodland improvement, conversion of steep land to pasture, and many others.

Few farmers are more enthusiastic about conservation farming. "Crops yields have definitely improved and the good ranges we have developed mean that pullets can be grown more economically," says Leader. The breeders are kept on good clover and bluegrass pasture and the result is lowered production costs and a higher percentage of eggs hatched.

In all, the four farms will have 300 acres of contour strip cropping when that practice is fully established. Leader points out that now "it is not necessary for the tractor operators to change gears

NOTE.—The author is soil conservationist, Soil Conservation Service, Upper Darby, Pa.

when working on the contour strips, as it was under our old system of field lay-out."

Leader's conservation farming has made it possible to produce more grain. "We produce all of our straw and fodder for litter," he said, "which tremendously reduces the cost of this important item. Considerable amounts of hay have been produced under the program, and we are keeping Angus cattle to use the hay and for pasturing some of the steeper slopes that were not suitable for growing cultivated crops."

The business is a real family enterprise. Mrs. Leader has been an active participant in the growing poultry business and yet found time to rear seven children. George, a son, is in charge of sales, incubation, and service. Guy, Jr. is farm superintendent. Paul, another son who was farm superintendent for 11 years, now breeds turkeys on an adjoining farm. He supplies his father and brother with a considerable portion of the eggs for heavy-breed, broiler chicks.

Leader is active as a civic leader. As a member of the Pennsylvania State Senate, he was instrumental in the passage of districts enabling legislation. He is an ardent supporter of the York Soil Conservation District. "I cannot speak too highly of the district and the knowledge and tact of the men of the Soil Conservation Service," he said. "We need much more soil-conservation work in York county, and the farmers have gained real confidence in the work of the district."



DISTINGUISHED OFFICIALS FROM ABROAD.—After 1 year in the United States a group of agricultural officials from India and Pakistan are returning to their homeland as the nucleus of the agricultural boards of those two countries in planning conservation programs. The officials were given training awards at the end of their studies with the Soil Conservation Service.

Left to right: Dr. A. T. Sen, M. Sc., Ph. D. (London), A. R. I. C., A. I. A. R. I., Soil Scientist, Ministry of Agriculture for the Government of India, Member of Executive Council and Senate, Decca University, India.

William X Hull, foreign liaison representative, Soil Conservation Service, Washington.

D. J. Gandhi, B. Sc. (Agr.), B. S. (Missouri), M. Sc. (Agr. Eng.), Assistant Agriculture Advisor to the Government of India.

Rao Sahib (Dr.) R. J. Kalamkar, B. Sc., B. Ag. (London), F. A. Sc. (Bungalore), Commissioner "Grow More Food" program for India during the war, Agricultural Advisor to the Government of India.

H. H. Bennett, Chief, Soil Conservation Service.

M. H. Kahn, B. Sc., A. I. F. C. (Hons), Forest Officer for the Pakistan Government

D. C. Kaith, B. Sc. (Edinburg), Forest Officer, Ministry of Agriculture, Government of India.

Dr. Abdul Ghafur Riaz, B. Sc. (Punjab), Ph. D. (Wales), Agronomist, Department of Agriculture, Government of Pakistan, manager of various experiment stations.

Dr. S. P. Raychaudhuri, D. Sc. (Calcutta and London), Ph. D. (London), F. R. I. C., soil scientist, Department of Agriculture, Government of India, during the war was on special duty with the "Grow More Food" program.

DOZEN FARMERS REPORT GAINS.—Farmers cooperating with the Hagerman-Dexter Soil Conservation District in Chaves County, N. Mex., find that improved irrigation practices increase yields, save water and labor, and conserve the soil.

The leveling of a 6-acre field on the Greer Bros. farm has increased the hegari yield from 15 tons in 1946 to 24 tons in 1947. In 1946, before this field was leveled, three men were needed to do the irrigation job. In 1947, one did it with ease and with a third less water. Greer Bros. leveled 58 acres with a farm-tractor equipment last year at a cost of about \$18 per acre.

W. E. Utterback reports that two men needed from 7 to 8 hours to irrigate a 9-acre field on his farm in 1946. Last year, after the field was leveled, one man did the job in 4 hours with the same head of water.

Land leveling cost E. O. Moore, chairman of the district board of supervisors, \$39.28 an acre, but he says; "the resulting increased cotton yield more than offset this cost in 1 year." Moore has not kept accurate records of water used before and after his land was leveled, but is sure that he now is getting much better distribution.

Other district cooperators reporting beneficial results from improved irrigation methods are B. L. Barnett, E. A. White, Royce Lankford, J. Michelet, H. Bogle, H. Meneff, M. D. Menoud, J. Langenegger, and V. R. Barnett.



Steers made heavy gains when put in early spring of '45 on this irrigated pasture on ranch of John and Ernest Myers, a mile east of Hoehne in Las Animas, Colo., which was planted early in March 1944. Fifty-one acres on ranch are in irrigated pasture, divided into units for rotated grazing. The mixture includes smooth brome, orchard grass, perennial rye, Reed canary, yellow sweet clover and Ladino clover; nurse crop is oats.

PRIME FEED AT LOW COST

BY WINNETT J. FITE

PASTURE is the cheapest feed that can be grown on the farm for forage-consuming livestock. Figures collected by the United States Department of Agriculture in 16 States show that each 100 pounds of digestible nutrients obtained from pasture cost 64 cents. In contrast, the same data place cost of digestible nutrients per hundred pounds of alfalfa hay at 83 cents, of corn at \$1.38 and of oats

at \$2.02. In Utah, the experiment station found that high-producing, irrigated lands produced 246 pounds of butterfat per acre in pasture, but only 215 pounds of butterfat when in alfalfa. Barley produced 144 pounds of butterfat and oats 98.

An example of the difference in cost between feed produced in an irrigated pasture and feed produced in a grain or hay field appears in the results of a survey made in southern Idaho at the Idaho Experiment Station. Feed costs of producing a

NOTE.—The author is a conservation aide, Soil Conservation Service, Lamar, Colo.

pound of butter averaged 20 cents over the entire year, but only 8 cents while the cows were on pasture.

In addition to being cheaper, pasture is a better balanced food, high in protein, minerals and vitamins. Besides all these advantages, pasture requires no cultivation or harvesting. Faced with these striking facts, certainly southwestern farmers—and many others, too—can use more pasture, and better pasture, to make their livestock more profitable.

Good pastures seldom just happen. They must be carefully planned, planted, and managed. Given equal care in planning, preparing the soil, planting, and managing as that accorded cash crops, a pasture will return dividends in extra production. Pasture can be grown on our best land and will provide income comparable, if not higher, than other crops over a period of years, at less cost for labor and equipment, and added improvement in the physical condition and fertility of the soil. Much land not now suitable for other crop production can be made to produce profitably in pasture.

The livestock-carrying capacity can usually be increased on a farm that is adequately irrigated, by establishing a mixed grass-legume pasture. Such a pasture can be fitted into most farm programs by arranging to produce any additional hay and grain needed for the additional livestock at times of year when the pasture cannot be grazed, or by using steers or some other class of livestock that can be marketed at the end of the pasture season.

Aside from factors of climate, soil, and irrigation, the grazing capacity of an irrigated pasture depends upon its plant species and the kind of management it receives.

Ranchmen in range livestock areas are increasingly recognizing the value of irrigated pastures for use during periods when livestock are not on the range. Some of them are finding such pastures profitable as the sole grazing areas for beef cattle. Irrigated pastures used to supplement native ranges make it possible to manage the latter conservatively and thus to increase livestock production. Where an irrigated pasture is available for early spring grazing, spring use of perennial native-grass range can be delayed. This results in greater yield of the native grasses.

A cow will eat her fill in a couple of hours or less on a pasture supporting a vigorous growth of

herbage, but on an overgrazed pasture a large amount of energy which should go into milk production is expended in search for grass.

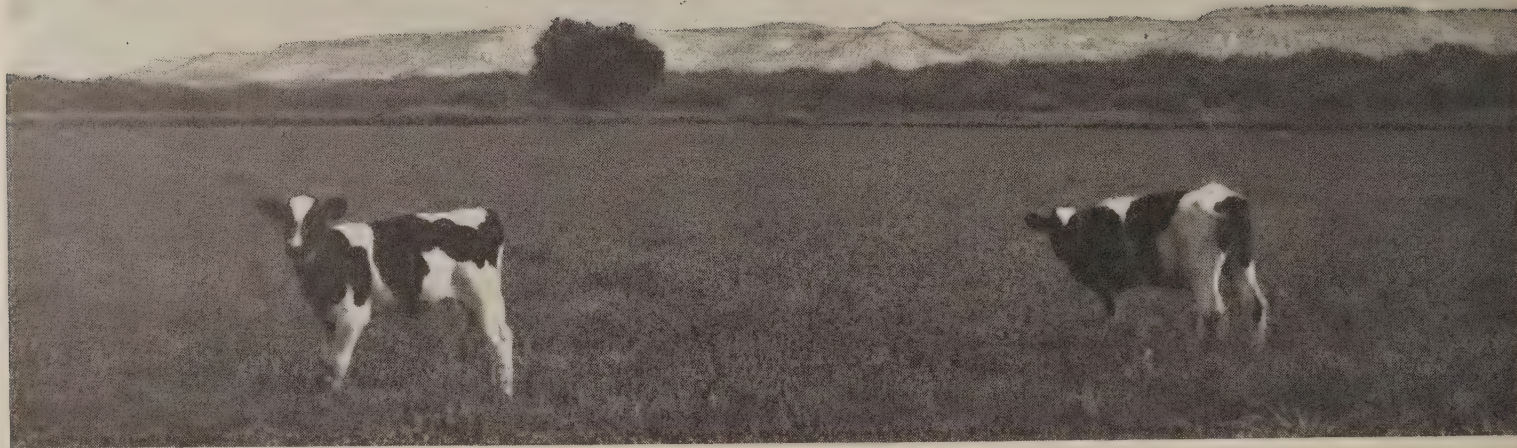
A cow will consume 100 to 150 pounds of green herbage each day if available, but on a closely grazed pasture this is impossible. It is obvious, therefore, that the deficiency must be made up by feeding hay.

On ordinary fertile land, unfertilized, the yield of green herbage at the beginning of the season will be around 400 to 500 pounds to the acre. But if the pastures are rotated 20 to 25 days later, the peak growth will reach 1,200 to 1,500 pounds.

In deciding on an irrigated pasture program, the grazing needs of the livestock and the capabilities of the land are considered jointly, and in relation to the over-all economy of the farm or ranch operation. Grazing needs depend upon the kind and number of livestock to be kept on the farm, as well as the type of livestock management. The land capabilities depend upon soil, slope, degree of erosion, presence of alkali, height of water table, and similar factors. Land capability maps prepared by the Soil Conservation Service are the basis for sound conservation farm planning. Help in such planning is obtained by farmers from soil conservation districts. When grazing needs and land capabilities have been determined, provisions are made in the farm conservation plan for the acreage of pasture required, its location, the rotation of pasture crops with other crops, and any special land-management practices needed to produce pasture crops and conserve soil.

Any land that can be irrigated at a reasonable cost is suitable for irrigated pastures. The worst productive pastures are those in capability classes I to IV. Class I land has no recommended limitation in use, it is suitable for production of all locally adapted crops without special management practices. Classes II and III are suitable for cultivation with special management practices recommended because of erodibility, height of water table, presence of alkali, droughtiness, low fertility, or other conditions. Class IV lands are suited to occasional cultivation only, and are much better adapted for pasture or for hay production than for production of row crops.

On irrigated lands of classes I, II, and III, pasture crops should be rotated regularly with cultivated crops, so that they may improve the soil of the whole farm. On class IV lands cultivated crops should not be grown except in connection



Dairy cows grazing on irrigated pasture of Paul Watts farm in Camp Verde Soil Conservation District, near Cottonwood, Ariz.

with re-establishing pasture crops or hay. On many farms it may be desirable and profitable to use greater acreages of class I, II, and III land than at present for pasture, especially for pasture in rotation with cultivated crops. The better the land, the better the pasture.

Satisfactory pasture crops can be established and maintained on any agricultural soil types.

The dense ground cover of a well-managed stand of pasture plants prevents soil erosion on sloping lands, and the dense root systems improve the structure of the soil and increase its capacity to absorb water. Grass roots, particularly, are effective in improving soil structure because of their volume, density, and fibrous character. They have a binding effect on light soils and a loosening effect on heavy soils, both of which contribute to tilth, permeability, and resistance to erosion. The organic matter contributed to the soil by grass roots decomposes more slowly than that contributed by roots of legumes or by annual green-manure crops. Combination of rapidly decomposing legume roots, which have a high protein content, with slowly decomposing grass roots results in prolonged benefit. Maintaining a balance of grasses and legumes leads to high sustained production of crops grown after the pasture stand is plowed under.

Soil improvement progresses most rapidly during the first few years of a stand of pasture plants. Later, it tends to level off. In general, therefore, the way to take full advantage of the soil-improving capacity of pasture crops is to rotate such crops with others in regular sequence.

Alkali-tolerant pasture grasses and legumes are among the best crops to grow on land that has

been drained but requires leaching. Rhodes grass, western wheatgrass, strawberry clover, sweetclover, and some other grass and legume species withstand flooding better than most crops. If planted where they are adapted, these species increase water penetration and thus increase the rate at which alkali salt is removed, in addition to providing useful forage during the period required for leaching.

Two or three grasses plus one or two legumes are usually an adequate number of species for the pasture mixture. Using a greater number of species seldom adds any value to the mixture, and complicates seeding and management.

Grass species differ as to seasons of flush growth, dormancy, and near dormancy. Some grasses grow most rapidly during the cool weather of early spring and others during the warm weather of late spring and summer. Species that grow rapidly in cool weather are desirable for use on areas where irrigation water for pasture use is available only in fall or early spring. Where water is available in spring and summer, grass species having different seasonal growth periods should be selected for use in mixture, so that the pasture, under good management, may produce the most uniform possible yield of high-quality forage throughout the grazing season.

Legumes are valuable in the pasture mixture in that they (1) contribute substantially to volume growth, especially during spring and summer, (2) are richer in protein and certain minerals than the grasses, (3) give variety to the forage and, being highly palatable, contribute to high-volume consumption of forage and thus to high

(Continued on page 240)

CONSERVATION IN THE CLASSROOM

BY ADRIAN C. FOX

ALTHOUGH soil conservation has been taught in some Iowa schools for 10 or 12 years, it was not until 1946 that it became a required subject at all grade levels in the rural elementary schools.

Miss Ivah Green made some interesting observations on the Iowa decision at a round table discussion during the annual meeting of the Soil Conservation Society of America, in Omaha. Miss Green is supervisor of rural education in the Iowa Department of Public Instruction.

"When education in soil and water conservation became a required part of the rural school curriculum," she recalled, "questions on the subject were incorporated into the State examinations. At first inexperienced teachers, untrained in conservation, became panicky because the subject of conservation was entirely foreign to most of them."

The introduction of conservation education into the Iowa rural school curriculum followed study and recommendations by a committee composed of representatives from the Department of Public Instruction, Iowa State College, Agricultural Extension Service, county superintendents of schools, and the Soil Conservation Service.

NOTE.—The author is head, educational relations section, Soil Conservation Service, Lincoln, Nebr.

The State's program is supported by teaching outlines and other aids issued by the Department of Public Instruction. But of equal importance to teachers and pupils, according to Miss Green, is the active support given by chambers of commerce, local chapters of the Izaak Walton League, National Audubon Society, Iowa State Conservation Commission, Agricultural Extension Service, Soil Conservation Service, and others. They have helped by providing such things as prizes for conservation posters, talks, etc.; free trees, shrubs and vines for wildlife habitat plantings; and guidance in the field study of soil erosion and the many conservation practices.

The children have studied farm crops, grasses, weeds, trees, insects, soil textures, wildlife, and other elements of country life. Many have made plantings of grass and trees in school yards or on farms.

In the classroom there have been demonstrations to illustrate wind and water erosion, conservation practices, plant growth; used, also, are salt maps, scrapbooks, conservation posters, etc.

Miss Green, in discussing the growing need for conservation education, stressed the importance of integrating this important subject into the elementary school curriculum at all grade levels.



Round table: Dr. M. D. Weldon, professor of agronomy, College of Agriculture, University of Nebraska; Harry Hagerott, chairman, district board of supervisors, Missouri-Slope Soil Conservation District, Mandan, N. Dak.; Morris Fonda, assistant to the president, Friends of the Land, Columbus, Ohio; Allen R. Lichtenberger, superintendent of Underwood Community School, Omaha; Miss Ivah Green, supervisor of rural education, Department of Public Instruction, Des Moines, Iowa.

She pointed out that since Iowa is an agricultural State, conservation education is essential in urban as well as in rural schools.

"Since many rural children do not attend high school," Miss Green said, "it is doubly important that they become erosion and conservation minded before launching upon their life work of farming. If these children become farmers, they will need education in soil conservation. If they move off the farm, they should be in sympathy with the soil-conservation movement."

The Iowa educator reported an interesting observation made by the parents of pupils who have been studying conservation in school. Parents say their children are showing an increased interest in newspapers, farm magazines, books, and other literature dealing with conservation. Of equal importance is the noticeable increase of parents' interest—no doubt influenced by John's and Mary's enthusiasm brought home from the one-room schoolhouse.

"Sell the 'school marm' on soil conservation and the job will be done," advises A. R. Lichtenberger, superintendent of Omaha's Underwood Community School, in his discussion of conservation education in the secondary schools. "Although the secondary schools are far behind the elementary schools in introducing conservation education into the curriculum, I believe they will eventually give it proper attention."

Lichtenberger agrees with educational administrators and teachers that conservation must be taught in the secondary schools by integration into such subjects as geography, biology, English, art, home economics, history, and so on through all the other subjects where it has appropriate relationship. In addition to teaching conservation by integration, he recommends that educators go a step further by introducing a special course on conservation. He believes such a course should be required of all students before graduating.

"A special high school course on conservation is necessary in order that each student may fully develop a sound and lasting soil conservation concept," he said.

Lichtenberger began teaching soil conservation in the days when school board members warned him to "go easy" as he was invading a new and untried field. He taught his classes the dangers of "murdered soils" and conservation during the dust bowl days when it was necessary to "bootleg"

the subject because of the complacency of some educational administrators.

"Fortunately," he said, "that day is past and soil and water conservation may now be taught with the blessing of the school board and educational administrators."

"Teachers should utilize all available resources in teaching conservation, such as State and Federal agencies. Such agencies can materially augment classroom teaching by familiarizing students with their conservation program."

"The elementary and secondary schools are responsible for the job of thoroughly indoctrinating the prospective college student with the fundamental concepts of soil conservation," said Dr. M. D. Weldon of Lincoln, Nebr., professor of agronomy, University of Nebraska.

Dr. Weldon, speaking on the need for conservation in colleges and universities, said, "It is the job of these institutions to provide practical and technical training necessary in developing the professional conservationist, the vocational agriculture teacher and the practical farmer. It is up to the agricultural colleges to develop curricula necessary to attain these objectives."

Discussing the special conservation curriculum of the Nebraska College of Agriculture, Dr. Weldon said that, in addition to the usual required courses, "students in the conservation group are required to study the conservation of natural agricultural resources, soil management, soil classification and survey, land drainage and irrigation, pasture and range management, livestock feeding, land economics, and public speaking. Elective courses also are offered in rural sociology, farm organization and management, farm machinery, surveying, mathematics, ecology, plant physiology, and other subjects, to fit the special interests and needs of the individuals. The curriculum offers the student an opportunity to develop an understanding of the economic, social, and scientific aspects of farming and of the principles of conservation as applied to farming. It affords only limited opportunity to develop skills in such operations as soil surveying and land-use planning. It is intended to prepare the college graduate to make the maximum use of his subject observations and experience in soil conservation and farm management."

Harry Hagerott, Mandan, N. Dak., the farmer representative on the round table and chairman of the district board of supervisors, Missouri Slope

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Looking BACKWARD—and FORWARD—on the CONSERVATION FRONT

By HUGH BENNETT

MY FIRST UNDERSTANDING and genuine interest in the subject of soil erosion was when W. E. McLendon of Bishopville, S. C., and I were making a soil survey of Louisa County, Va., in 1905. Our chief, head of the old Bureau of Soils, had instructed us to look carefully into the reason behind the reputation of the region for the poverty of its farmland.

This investigation proved stimulating, something outside daily routine. We found considerable naturally poor land—soil formed through the decomposition of talcose schist—but we found also many sloping areas of cultivated or formerly cultivated land which had been made poor by erosion. In woodlands that had never been plowed, there was always deep loamy soil. This was rich in humus and so mellow at all times you could dig into it with bare hands. In many adjacent fields, however, there was stiff clay—subsoil—at the surface. Usually this hardened almost to the condition of rock with every dry spell. Under cultivation, a profound change had come about: With every heavy rain, the mellow topsoil had been stripped from entire fields at a time in a thin layer (or sheet) as water flowed off the fields into the streams muddied with suspended soil.

We realized, when we came to understand this continuing process of soil removal, that we had learned the real meaning of sheet erosion, which today is considered the most widespread and costly form of the erosion process.

NOTE.—The October 1947 issue of Soil Science was devoted entirely to soil conservation and good land use. By kind permission of Dr. Firman E. Bear, editor, we are repeating here a few things said by the Chief of the Soil Conservation Service in his paper, "Development of our National Program of Soil Conservation."

This fundamental discovery started me on a long journey, studying the erosion process and what it had done to the land over the United States and other countries. But it failed to arouse much interest in Washington. I have suspected that it did not fit in with certain theories about soil fertility that were held in some quarters at about that time. At any rate, not much about the subject found its way into the published report on the Louisa survey.

Following this experience in the Virginia Piedmont, my next most revealing find was in Fairfield County, S. C., where a soil survey was made in 1910–11. This survey showed that of the 438,000 acres in the county, 28 percent had been so damaged by erosion that the land had no further practical value for immediate cultivation. In addition, most of the topsoil had been stripped from 16 percent of the land. Since that time, the damaged area has extended even further. Some of the roads we drove over in 1911 with horse and buggy have been completely abandoned because of erosion.

The rural population of Fairfield County at that time was 29,442 (census 1910); the corresponding population in 1940 was 13,462 (census 1940). More than half the farm people had quit the farm! That is one of the deadly things uncontrolled soil erosion does: It forces people off the land by impoverishment or ruin of the soil.

I thought, then, that when the report giving those dismal details of land wastage in Fairfield County was published it would arouse considerable interest. To my astonishment, it didn't even ripple the placid surface of our national complacency with respect to the welfare of the land. People just were not interested at that time.

Later, I came to understand something of the difficulties of developing national interest in the welfare of the land. Findings more or less like those in Fairfield County were reported from other parts of the country—from Stewart County, Ga., and Lauderdale County, Miss. But nothing happened. There was neither interest nor comment, just pure indifference—inheritance from those days when our forefathers felt we could never use up our supposedly limitless supply of “indestructible” land! Some well-meaning soil students of the time became so interested in complex fertility studies that they overlooked the terrific rate at which good farmland was being wasted by erosion—never tied it into its relation to the productivity of our agricultural land and our national economy. Some soil specialists thought the land was completely safe, and said, in 1909: “The soil is the one indestructible, immutable asset that the Nation possesses. It is the one resource that cannot be exhausted; that cannot be used up.”

When I read that unqualified assertion, I learned that it is possible to put much misinformation into two short sentences. The unfortunate truth is: Soil is subject to such waste and violent changes by erosion, under hard usage, that, as a nation, we can get along only if from now on we take scrupulously good care of our every remaining acre. Too many farms and too many localities already have come to agricultural grief to permit any further fruitless and costly theorizing, offering of panaceas and short-cuts for soil conservation, and assertions without supporting evidence that “we can get the job done better.”

In addition to information on the effects of erosion given in some of the older soil survey reports, the Bureau of Soils published three interesting papers that dealt mainly with the effect of erosion—two with water erosion, the third with wind erosion. Shaler in 1890, had pointed to the seriousness of the problem and offered some general suggestions as to what needed to be done. In 1908 Chamberlin also gave some pertinent suggestions on soil conservation, especially in his recommendation that farmers should strive to trap as much of the rainfall as possible in the body of the soil.

* * * the highest crop values will usually be secured when the soil is made to absorb as much of the rainfall and snowfall as practicable. In securing this maximum absorption * * * the run-off, and * * * the surface wash, will be reduced to a minimum. It has already been seen that the wash of even this inevitable minimum is likely to be still too great to keep the proper slow pace with

soil-generation, when the surface has much slope * * * The practical problem then lies almost wholly in retaining and passing into the soil the maximum of precipitation. Obviously, this gives the minimum of wash to foul the streams, to spread over the bottom lands, to choke the reservoirs, to waste the waterpower, and to bar up the navigable rivers. The solution of the problem for the tiller of the soil essentially solves the whole train of problems running from farm to river and from crop-production to navigation. . . .

Until about 20 years ago the word “topsoil” was seldom heard. And only a few—soil specialists, road builders, and excavators of earth—ever made any very meaningful use of the word “subsoil.” Expressions like normal erosion and accelerated erosion had not found their way into our dictionaries and agricultural treatises.

Even now, too little attention is devoted to the part good productive land plays in the provision of a healthful, nutritious diet. When the topsoil is allowed to wash off the land, that action completely and wastefully disposes of the whole surface soil layer and all it contains—all that nature and man put into it, including elements of nutrition, both major and minor, and the microscopic organisms that help make land productive by assisting with the conversion of unavailable soil constituents into available plant nutrients. We need to know a great deal more about the relation of eroded land to nutrition. We should understand that what is commonly left for the farmer to till is unprocessed, stubborn subsoil, which usually is less absorbent of rainfall than was the topsoil, is more difficult to plow, and is much more deficient in all available plant nutrients.

Subsoil can be improved, of course, but lost topsoil, which is the most productive part of natural soil, cannot be restored within measurable time. And it cannot be brought back from the floor of the ocean. It cannot be mined from the depths of the earth or made by pulverizing rocks. It cannot be grown; it cannot be bought from foreign countries for stockpiling.

Subsoil can be improved with good cultural treatment, including especially the growing of grasses and legumes and the addition of organic manures and mineral nutrients. But even with such beneficial treatment, some particularly unfavorable subsoils do not produce favorably. Generally, subsoil is less productive than the corresponding topsoil, regardless of treatment. For example, the subsoil of Cecil sandy clay loam in south-central North Carolina produced without fertilization, 290 pounds of seed cotton per acre, compared with 950 pounds under the same treat-

ment by the corresponding topsoil immediately alongside (3-year average). With the same fertilization (green manure and 400 pounds per acre each year of a 4-8-4 fertilizer), the corresponding topsoil and subsoil produced the same years an average of 1,123 and 759 pounds of seed cotton, respectively. Here the ratio of productivity as between untreated subsoil and topsoil was 1:3.2; with fertilization the productivity ratio was reduced to 1:15.

Corresponding topsoil and subsoil of a quite different soil type—Muskingum silt loam, in eastern Ohio—produced without fertilization 33.5 and 0.8 bushels of corn per acre, respectively, as an average for 4 years. Here the productivity ratio—for corn—as between subsoil and topsoil was 1:42.

In both soil types the varieties grown on the corresponding plots were the same and the cultural treatments were identical. Also, the corresponding subsoil and topsoil were essentially identical (as shown by total analysis) in chemical composition except that in both soil types the subsoil contained less organic matter and nitrogen.

It appears that the difference in productivity in both of these soil types is due chiefly to the much lower state of availability of plant nutrients in the subsoils. For this reason and others, soil erosion may be the principal cause of malnutrition—and famine. . . .

Throughout the country, the technicians and research specialists of the Soil Conservation Service have been striving to develop as rapidly as possible new field methods and new machines adaptable for use in the control of erosion and in caring for the production needs of each varying locality. Steadily, all this work is taking the form of a new agriculture in our country, an agriculture based primarily on soil conservation farming methods. . . .

Looking ahead to the time when all of the Nation's farmlands have been treated with sound, basic soil conservation measures—which I think could and should be done in a much shorter period than 100 years—we shall see that striking changes have taken place across the country. Probably among the most outstanding of these will be those tell-tale landscape characteristics which show that our highly variable land has been treated, acre by acre, with efficient measures of protection that can be applied only through the hands of those who know and love the land and understand its needs,

capabilities, and importance to the individual and the Nation.

All types of land will be in productive use of some kind. There will be no such areas as we now commonly see in useless hideous gullies, burned-over skeletons of forests, and wildernesses of bramble and scrub. Valuable forests and protective growths of grass, vines, and other useful plants will cover those areas that have been made useless for further cultivation through unwise cropping.

Adjustments in land use will have been carried to the point where the more hazardous kinds of farming operations will be appropriately fitted to soil, slope, and climate. Cultivated crops will be on the flatter lands where the soil is deeper and more productive; the steeper lands of shallower, more erodible soil will be covered with trees, grass, or other protective growths.

Man on the land will have been adjusted to his environment better than ever before. His reward will be easier farming, safer farming, large yields, increased income, and increased happiness. People will be more neighborly and will have a better prospective on our individual and collective obligation of stewardship toward the land.

CONSERVATION IN THE CLASSROOM

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Soil Conservation District, introduced himself as a "practical dirt farmer bringing from the 'grass roots' to the professional educator a crying need for conservation education in the public schools."

Hagerott said that he has observed the ineffectiveness of some devices designed to create adult interest in the need for soil conservation.

"A farmer must be first of all a soil conservationist," he said, "and, in addition, he must have a practical knowledge of agronomy, forestry, hydrology, and all the other 'know-hows' that go to make a successful farmer-soil conservationist.

"The mere existence of State and Federal conservation agencies will not alone put conservation on the land. Conservation education must start early in a child's education, as religion does, and be continued. It is a mistake to educate from the old folks down; we should educate from the young people up! Soil conservation must start in the heart and mind. If it starts there, it won't be long until it is on the land. The early advice of Horace

Greeley to 'Go west, young man, go west!' should long since have been replaced by the motto, 'Conserve the soil, young man, conserve the soil!'

Morris Fonda, round-table chairman and assistant to the president, Friends of the Land, summarized the round-table discussion by stressing the importance and current need for an in-service and preservice teacher program that would equip teachers to do an effective job of teaching conservation education in both elementary and secondary schools.

He reported that summer workshops conducted on an individual county basis, under the supervision of local county superintendents, with college credit granted by a nearby educational institution, has been very effective in Illinois. Other States have successfully employed the workshop method of in-service training during which 1 to 6 weeks of study are devoted exclusively to conservation of natural resources, including soil and water.

The training of teachers by the summer workshop method is a slow process. Fonda believes that the teacher-training institutions must bring their curricula up to date, so that teachers will receive training in conservation before they start to teach in the public schools. Thereafter, summer workshops will be sufficient to keep teachers up to date on latest developments in soil conservation and its teaching.

PRIME FEED AT LOW COST

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animal gains, and (4) if inoculated, take part with soil bacteria in fixation of nitrogen from the air, reduce the need for applying nitrogen to the pasture as fertilizer, and increase the amount of nitrogen available in the soil to crops used in rotation with the pasture mixture. Legumes should make up at least 30 percent and not more than 50 percent of the number of plants in the pasture stand. If constituting more than 50 percent, they may create serious danger of bloat.

Each plant species to be used in establishing an irrigated pasture should be selected for its adaptation to the climatic and site conditions, its grazing qualities, and its seasonal rate of production.

In general, grasses and legumes are adapted to wide ranges of soil and other site conditions.

Deep-rooted legumes are not adapted to shallow soil, or to soil having a high water table. Both grasses and legumes vary in their adaptation to wet, poorly drained soils and to alkaline soils, and only species of known tolerance should be included in mixtures seeded on such soils. Mixtures to be used on very sandy soils should include deep-rooted legumes and sod-forming grasses.

A well-managed pasture affords an ideal use for sloping areas of erodible soil that cannot be leveled to nonerodible grades. As irrigated pastures, such areas become permanently productive. Livestock production is a suitable use, also, for the best of irrigated farm land. Good pasture is profitable wherever livestock is kept. It is a crop that improves the land while it is producing. It can be handled with a minimum of cost, and it walks off the land when harvested.



Doyle S. Lund, district conservationist, Richfield, Utah, takes a close look at a mixture of forage plants in Floyd Taylor's irrigated pasture in the Fremont River Soil Conservation District. Seeding was done in 1944 to a mixture of adapted grasses and clover. At this elevation—6,200 feet—smooth brome grass and timothy produce good forage yields and help hold the soil in place.

NEW GRASS FILLS GAP IN NORTHERN GREAT PLAINS

BY A. D. STOESZ AND HUGH K. RICHWINE

A WHEATGRASS that came from the north shores of the Black Sea in Russia—at about the same latitude as the State of Nebraska—has already indicated that it may be the answer to the hunt for a satisfactory cool-season grass for western Kansas. It also does well in western Nebraska. And in South Dakota, where it was first given major attention, there is the chance that it may satisfactorily fill the gap between the ranges of crested wheatgrass and brome grass. It may even replace both species in certain areas.

This grass is intermediate wheatgrass (*Agropyron intermedium*). In appearance, it is generally like the other wheatgrasses. In some ways it is like the native western wheatgrass, and in other ways it is like the introduced crested wheatgrass that came from farther north in Russia. But many of its characteristics are intermediate between the two. Hence, its name.

When intermediate wheatgrass was first introduced into this country in the twenties, its aggressiveness caused plant technicians to fear that it might become a pest. Agricultural workers shied away from it because of its superficial resemblance to quackgrass. They considered it a cousin of quackgrass, and that gave it a bad reputation. Later studies, however, showed that the grass can easily be eliminated by plowing and that its aggressiveness constitutes a decided asset in conservation work.

It is this aggressiveness, so effective in helping to conserve soil and water, that has sharpened the interest of the Soil Conservation Service.

Intermediate wheatgrass is a long-lived, sod-forming perennial. It is like western wheatgrass in growth habits but, owing to its late maturing, it remains green longer than most grasses. The leafy stems are erect and from 3 to 4 feet tall. The seed heads are slightly nodding, from 6 to 14 inches long, and resemble those of other wheatgrasses. The seeds are large, free from hairs on long awns; they thresh clean and with one cleaning by a

fanning mill can be seeded with an ordinary grain drill. Since this grass possesses great variability of plant types, there is an opportunity for natural selection.

Experience has indicated that the seed should be drilled in the fall, at about the time for planting winter wheat. If spring planted, it should be at oat seeding time. In either case, the seed should be put one-half to three-fourths of an inch deep in heavy soils and 1½ inches deep in sandy land. Seeding rates range from 6 to 10 pounds per acre, except where it is planted in 40-inch rows to be cultivated for seed production. Then the rate is 4 pounds per acre.

Seedlings are vigorous, resembling newly emerged winter rye seedlings. They emerge about a week after planting and become established quickly. Furthermore, they are resistant to most seedling diseases, with the result that stands are usually good and even. Like other cool season grasses, intermediate wheatgrass starts growth early in the spring and continues to grow in the fall, despite spring and fall frosts. If moisture is favorable during the summer, growth continues although less actively.

To test the range of adaptability of this grass, Soil Conservation Service nurseries, in cooperation with state agricultural experiment stations, made numerous trial plantings in the Northern Great Plains. It has been found to be completely cold resistant, but does not seem to thrive so well in the northern part of the region as farther south. It endures considerable drought, although seemingly not so much as crested wheatgrass. In Utah, however, it is reported to be equally as resistant to drought as crested. It appears to be more tolerant to summer heat, which accounts for its greater adaptability farther south than other introduced cool-season grasses. Like most grasses, it does best on fertile, loamy soils; and it tolerates about as much alkali as western wheatgrass. Its best use in the Northern Great Plains seems to be in the zone between brome grass in the east and crested wheatgrass in the west, although on

NOTE.—A. D. Stoesz is chief, regional nursery division, Soil Conservation Service, Lincoln 1, Nebr. Hugh K. Richwine is district conservationist, Soil Conservation Service, Dodge City, Kans.



Two-year-old stand at Soil Conservation Nursery, Mandan, N. Dak.

properly selected sites its area of use can be extended.

Seed production of a new grass is important in its adoption for farm and conservation use. A hatful of seed collected at Fort Collins in 1937 by Wayne W. Austin, a nursery employee, was seeded at the Soil Conservation Service nursery at Vermillion, S. Dak., that fall. A few pounds furnished to the South Dakota Agricultural Experiment Station at Brookings is the source of its Ree wheatgrass. The first seed crop in 1939 and for the 2 years following was used for further seed increase and for adaptation trials. In 1942, over 1,000 pounds of seed grown in Soil Conservation Service nurseries were distributed to soil conservation district cooperators for seed production to supply local needs. The following amounts were distributed in the five subsequent years: 1,251 pounds, 1,868 pounds, 7,660 pounds, 4,317 pounds, and 8,950 pounds.

Many farmers in soil-conservation districts are now supplying their own needs for additional seedlings and are offering seed for sale. In Kansas, for example, approximately 1,000 acres are devoted to seed production. The demand, however, still exceeds the supply and seed is still selling for from 75 cents to \$1 per pound. The South Dakota State Agricultural Experiment Station is certifying intermediate wheatgrass as to species as Ree wheatgrass through its crop improvement association. Thus, from a small lot of seed, the supply is now built up to where farmers are offering it for sale. Before long seed should be available in larger amounts through regular trade channels.

Intermediate wheatgrass has already shown itself good for a variety of uses. Because of its seedling vigor and its ability to produce a quick,

effective cover, it is good for waterways and terrace channels. Livestock graze it readily. When it is cut in the early flowering stage, it makes excellent hay. Its early spring and late fall growth lengthen the grazing period and reduce the time of dry feeding. This also saves the native range by delaying grazing in spring until the native grasses are ready.



Two-month-old stand on B. F. Roberts, Jr., farm, 16 miles southeast of Scottsbluff, Nebr.

This is what farmers cooperating with soil-conservation districts in Kansas, Nebraska, South Dakota, and North Dakota say about intermediate wheatgrass:

Clarence Neglie, Larned, Kans., planted 6 acres in 1944 and says: "It comes up quickly, it grows fast, and cows like it. After threshing the seed, I stacked the straw for bedding, but the cattle ate it before I got to use it. This fall it made 8 inches of growth after October 1 and that spot where the water stood for a month is greening up. I planted some more this fall."

Ira Neglie, Larned, Kans., planted intermediate wheatgrass on a sandy strip along his pasture. He says: "It was a dry fall, spring and summer, but the stuff came up, along with volunteer wheat, cheat, and June grass. It nearly blew out once. Even so, it made a good growth and is spreading rapidly."

Jim Greenleaf, Greensburg, Kans., planted the seed on soils ranging from sand to good alfalfa ground and found it doing well on all of them. After he had seeded it in the fall of 1946, an experiment station worker told him that they had tried it and found it wouldn't stand dry weather. Greenleaf says: "His statement caused me to lose interest, but they must have tried something else because it has been about as hot (100° F.), dry, and

cold (19° below) the past year as it ever gets here and it is still doing well. I have been pleasantly surprised at the way it grew and spread last summer and fall, when it was hot and dry enough to thin out the old stand of western wheatgrass."

Henry Jordan, Larned, Kans., offers the opinion that the intermediate wheatgrass he seeded on a heavy soil infested with dogbane will eventually choke the weed out. He also says that his cattle prefer it to wheat pasture, and continues: "When we get too much wheat, I think a lot of hilly land will be planted to intermediate wheatgrass to hold it and build it up until it is needed again. It



Seed plot on Leo Bales farm, 20 miles southwest of Osborne, Kans. It was drilled into sorghum stubble in November and photographed the following May.

really fits in for early grazing until the native grass is ready."

Nathan Hayse, Jr., Mullinville, Kans., states that "it is just the grass we want. It stopped growing in July when it was hot and dry and started again in October when it rained. We pastured it extensively but it still looks good. I'm going to cultivate those 32-inch rows and raise a good seed crop this year. I've just got to raise seed to plant on that rough 80 over west."

Lyman Long, Ford County, Kans., planted intermediate wheatgrass along the sides and bottom of a draw where "it made more growth in 1 year than the brome grass at the other end has made in 3 years."

Intermediate wheatgrass was planted in 30-inch rows for seed production on the L. T. Miller farm,

Kinsley, Kans., in October 1944. It made a good seed crop in 1945, even though it was not cultivated. The yield was a little over 200 pounds of clean seed per acre.

"The year 1946 was dry," says Herman Schoeller, tenant on the Miller farm. "Total moisture for the year was 16½ inches, but we have received only 6.38 inches before August 1. The intermediate wheatgrass on this droughty land (18 inches of soil with sand and gravel underneath) stopped growing early in July and cured up. But after it rained in late August I turned 19 cows and a few calves on a 6-acre patch. The cured growth, plus the new growth, furnished plenty of feed for them for 6 weeks."

In 1947 an attempt was made to thin the stand in order to get a better seed crop, and the seed from that 6-acre field brought more than \$1,000.

Elmer Nelson, Broken Bow, Nebr., turned his cattle into an intermediate wheatgrass pasture in April, where they grazed until the middle of May. Then he fenced the livestock out to save what was left for seed production. He says, "The cattle stayed on the intermediate wheatgrass as much as on the other grasses, indicating that they like it as least as well as crested and brome." In his opinion "intermediate wheatgrass is the best cool season grass for the hill lands of Custer County and it is excellent for grassing waterways."

Henry Hanmont, near Broken Bow, Nebr., found that his yearling steers grazed intermediate wheatgrass closer than the native meadow. Even so, by taking them off May 1, he made it possible for the grass to grow to a height of 3 feet by July 15 and expected to harvest 100 pounds of seed per acre.

A. Craichy, Burwell, Nebr., notes that "the neighbors' cows stay on my intermediate wheatgrass whenever they have a chance. It will make a wonderful hay grass due to the dense foliage at the base, as well as good early spring and late fall pasture."

A grass must be good to merit such devotion from farmers who are using it. As time goes on more will be known about it, additional uses will be found for it, and certain limitations may possibly be discovered. In the meantime, farmers are using it profitably and at the same time are producing more seed for extensive use by neighboring farmers and eventually on a Nation-wide basis wherever it is found adapted.

MAKING "BIG MUDDY" BEHAVE

(Continued from page 229)

tons of icepacks moving swiftly down river, some of the smaller pieces resembling lone Indians in fast moving canoes. In summer, from Inspiration Point and Mount Marty Hill, you can look south and west and revel in the fascinating twists in the river, the sandbars, the distant trees, and the brilliant setting sun.

Too often we drink in the beauty of a river such as the Missouri and fail to see the destruction and havoc that goes with it.

When you get down near the other end of the line, and visit with farmers and townsfolk who have been hit by flood, then you begin to realize what a treacherous, lawless, looting robber of our soils and resources it really is.

The Missouri is just a magnified example of the thousands of little rivers, creeks, and gullies in our rich United States. Almost, every farm and ranch in the United States has its own Missouri River chopping and eating away its bank of soil deposits.

And it's only through the harnessing of our gullies, creeks, little rivers, and tributaries of the Big Muddy that we are going to make a lasting impression upon the Missouri itself.

One example of what a lone farm can do was brought out in an interview with Joe Bennett, a good farm operator in Atchison County, Mo.

As Mrs. Bennett put it, "Their farm land reaches from the highest hill to the lowest bog."

From the living room of their house, built on a cut-away bluff overlooking the Missouri and Nishna Bottna River bottoms, she pointed out to me a beautiful level field that once harbored a lake 20 feet deep surrounded by swampy, boggy, bottomland.

Joe Bennett explained how he reclaimed 100 acres of good farming land by filling in this lake-land through draining, ditching, and diking. By ditching and diking, he forced a creek into the bottomland, and with proper drainage finally saw satisfying results as flood waters brought in ton after ton of good, rich topsoil from other farms and left it high and dry for him to farm—land that was definitely headed for the Gulf of Mexico.

"Now," says Joe, "I can dig down from 14 to 20 feet almost anywhere in that field and find

nothing but the richest of topsoil. I can crop that land from now 'til the end of time with my present system, and I will always have good, fertile land."

Another example of how the Missouri, its tributaries, creeks, and gullies inflict havoc upon farmers and townspeople in the vicinity of Hamburg, Iowa, and Atchison County, Mo., was brought out by Roy Carpenter, owner and operator of Apple Mountain Farms.

"Hamburg has been inundated with floodwaters from the Missouri and Nishna Bottna Rivers three times in the last 5 years," said Carpenter. "Those two rivers meet right here and when they have a get-together, it's just more than the people can stand."

Carpenter also told how their hill land washed down into the bottoms, and how they went down and bought the bottom land. They bought their own land over again so they could farm it.

Now they are terracing the hill land and protecting the bottom land against flooding waters. "But the big job," says Carpenter, "is work up and down the river. It takes Government aid with large sums of money, along with the individual farmer and community projects."

They are definitely interested in the work being done in the Dakotas. They are at the mercy of the floodwaters. It's a feeling similar to living in the shadow of a waterfall that may gush and spread at any time and wipe out years of work and effort in building a home.

From the southeast tip of South Dakota to the northwest tip of Missouri, or Atchison County, as the crow flies, or the river flows, or the road runs, it's approximately 150 miles, no farther than from Sioux City to the Wheeler Bridge, out by Bonesteel. Only 150 miles of the Missouri River stretch between South Dakota and Missouri, and yet there are over 500 miles in the Dakotas alone, not counting the loops, curves, and bends.

Five hundred miles of river that drains millions of acres of precious land! That 100 acres of soil saved on the Bennett farm in Missouri, a part of it from the Dakotas, is just a cupful alongside what goes down the Missouri past our door each day in the form of muddy, murky, water.

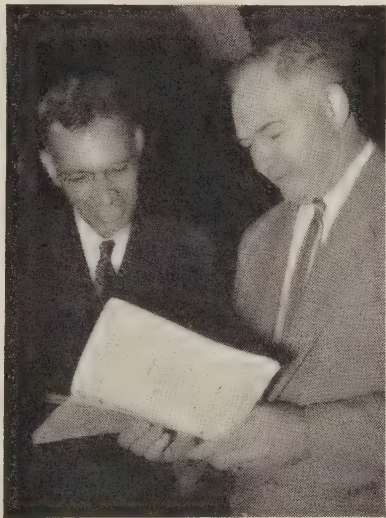
We worry and fret about the prices of grain and livestock and other commodities as they go up or down, but fail to be perturbed in the least about the millions of dollars worth of the stuff it takes to raise and make these commodities, as it

goes floating by our door down the river to the Gulf. Yes, "There's gold in that thar river."

This story, of course, has dealt with saving as much as possible of the rich soil which has swept out of improperly used fields and overgrazed pastures to be temporarily lodged in the river bottoms. In dealing with this phase of the far-flung erosion problem, that extends out over millions of acres between our major stream channels, it is not in any sense meant that soil conservation should confine itself primarily to saving soil after it has departed from the fields and pastures on its long journey to the oceans. The bigger problem, of course, is the control and prevention of erosion in fields and pastures before the soil is dislodged, picked up, and swept away by excessive runoff from uncontrolled rains and melting snow water, and thus started on its seaward journey.

Short contributions such as those on the following pages are invited by Soil Conservation Magazine. A good idea may be helpful to another district, another farmer. Share your experiences!—Editor.

WESTERN GULF



Dr. Riaz. . . . Dr. Shuhart.

FROM TIGERS TO TEXAS.—Dr. A. G. Riaz, agronomist of the Pakistan Soil Conservation Service, and Dr. Donald V. Shuhart of the Fort Worth regional Soil Conservation Service office. The two met in Fort Worth recently for the first time since Shuhart was injured by a tiger on a hunt in Assam Province, India, during the fall of 1945. At that time Dr. Riaz and Dr. Shuhart were working together on a preliminary soil conservation examination of India. Dr. Shuhart has gone on the mission for the State Department. Dr. Riaz came to the United States a year ago for the government of India, but when Pakistan was formed he became a representative of that government.

EXPRESSIVE.—Arthur B. Kennerly, editor of Farm and Ranch Magazine at Dallas, Tex., has come up with a new soil-conservation term. It's "gullyum." He uses it in talking of farmers who don't take care of their land. For example: "He's going to gullyum wherever he farms."



GOOD IN ANY LANGUAGE.—A newspaper published in South Texas prints news of soil-saving activities in two languages. Items submitted by the Agua Poquita and the San Diego-Agua Dulce Soil Conservation Districts appear in Spanish when the farmer-cooperators mentioned are of Mexican extraction.

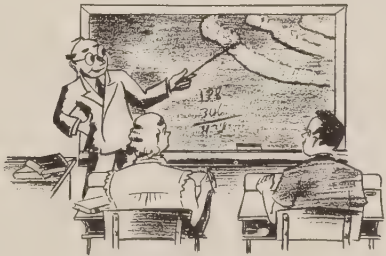
The material is used in English when the farmer or ranchman being discussed can't speak Spanish.

Two paragraphs from *Notas de Kingsville* published Jueves, Enero 29, 1948, say:

"Frank Vaello reports that the sand lovegrass he planted about the 20th of November is up to a good stand. Frank secured the seed from the San Diego-Agua Dulce Soil Conservation District supervisors. From all available information it seems improved and native grasses should be planted in the fall on land that has had a summer soil improving crop on it."

"Francisco Salinas, uno de los cooperadores del 'Agua Poquita Soil Conservation District' tiene toda su tierra preparada al nivel. Tuvo la asistencia de los tecnicos del distrito y tambien le ayudaron a determinar la maera mas facil para bordear. Salinas esta muy contento pro la manera en que se preparo su tierra este ano, y dijo que de ese modo levantara mejores cosechas porque todo el agua sera bien destribuida en su labor."

SOUTHWEST



TEACHING SOIL CONSERVATION.—The teaching of soil conservation has been started in the schools of Phoenix, Ariz., according to Mildred S. Keifer, supervisor of intermediate and upper grades. The subject is being taught in the science studies course in the seventh grades. Packets of suitable publications on the subject have been furnished to the school libraries by the Soil Conservation Service. Some Phoenix schools also are teaching soil conservation in connection with other courses in science, social studies, and agriculture.

The Arizona Education Association recently adopted a resolution urging that more attention be given to soil conservation in all State schools. The resolution urged more rapid application of soil-conservation practices on the land through the democratic methods of soil conservation.

40-ACRE QUICK-CHANGE.—A 40-acre Quay County, N. Mex., farm will be completely remade in a single day next October to demonstrate the application of soil- and water-conservation practices.

This 1-day demonstration, the only one of this sort planned for New Mexico during 1948, will be sponsored by the supervisors of the Canadian River Soil Conservation District. This will be the first "remaking-a-farm" demonstration to be held on irrigated land other than the one at Cottonwood, Ariz., April 27.

Preliminary plans call for the grubbing of mesquite, land leveling, construction of irrigation ditches and borders, plowing, seeding, and irrigating of the land between dawn and dusk.

Newspapers and radio stations of eastern New Mexico and the Texas Panhandle have pledged full support, and farm equipment dealers have indicated that they will donate the use of all machinery necessary.

HE KNOWS BEANS.—Contour farming not only brought increased bean production worth \$15 per acre to Guy Jordan, farming north of Lewis, Colo., but also convinced him that this tillage practice is cheaper, speedier, and conserves soil and water.

Jordan kept accurate records on tillage operations, time required for each operation, fuel costs, and yields on three farms which he operates.

Two of the farms are in the Dolores Soil Conservation District. One is a 40-acre tract which Jordan purchased in 1946, and the other is a rented area of 85 acres. Both were farmed without terraces or contour tillage. The third farm of 125 acres, also rented by Jordan, was terraced several years ago and was farmed on the contour last year.

Jordan's records show that the 125-acre terraced and contour-tilled tract produced an average of six 100-pound sacks of beans per acre, while the two straight-row fields yielded only 4½ sacks per acre. Figuring beans at 10 cents a pound, Jordan says that the yield from the contoured field brought him \$15 per acre more than the straight-row fields.

Seven tillage operations were carried out on each of the fields prior to harvesting. On the terraced and contoured field Jordan covered 2.62 acres an hour, while using only 1.72 gallons of fuel an hour in carrying out these operations.

The average acreage covered in operations on the two straight-row fields was 2.04 an hour, while fuel consumed averaged 1.87 gallons an hour. In other words, Jordan found that he covered 0.58 acre more each hour on the contoured field, and used 0.15 gallon less fuel.

These figures, Jordan points out, should disprove the idea that contour tillage takes more time or is more expensive. Jordan also observed that the terraces and contour rows held moisture on the ground where it could seep into the soil to aid crop growth, while on the straight-row fields he saw considerable run-off with valuable topsoil being carried away.

IN CELLULOID AND SOUND.—Of interest to soil conservationists is a new 16-mm. motion picture, *Exploring the World About Us*, produced in color and sound by the extension study division of the University of Utah, Salt Lake City.

This film, which is designed to acquaint elementary teachers with improved methods for teaching science, was directed by Miss Ruth Lippenberger, science training supervisor at the university. Scenes were taken in typical classrooms in the Salt Lake City area. Science teaching in the first, fourth, and fifth grades is shown, with the study of soil conservation in the first and fourth grades being featured. A Soil Conservation Service work-unit conservationist is shown conducting a class on a field tour during which erosion is observed and soil-conservation practices are explained.

BIG SCALE CONSERVATION.—More soil and water-conservation practices have been applied on the 30,000-acre Banning-Lewis ranches in El Paso County, Colo., than on any other farm or ranch in the United States.

At least this is the claim of supervisors of the Central Colorado Soil Conservation District.

The range lands which the Lewises operate have a long and romantic history as grazing lands. After the buffalo became practically extinct in this area, riders of the great trail herds used to head for this area because the bluffs formed natural corrals which helped to hold the cattle driven from Texas to Wyoming and Montana.

About one-third of this ranch has been treated with contour furrows and pasture terraces to conserve moisture and increase grass growth. Water-spreading systems, which provide natural irrigation of grass land and prevent concentration of run-off in gullies, have been installed on 2,500 acres. There are 5 miles of gully diversions, 40 stock water dams and wells, 3 soil-saving dikes, 9 spring developments, and 90 miles of fire guards.

Some 400 acres of formerly cultivated land have been reseeded to permanent grasses such as crested wheat and brome. Ten irrigation and flood-control reservoirs have been built. Wildlife has been fostered and developed. Contour farming is practiced on 125 acres and irrigated pastures and irrigation sprinkling systems have been developed.

The most outstanding practice, however, is that of grass management. Proper stocking and use have improved the grass until the 90 miles of fire guards are a real necessity. Not only do Lewis' registered Herefords have a maximum of forage, but erosion has been reduced to a minimum. The Lewises have blended scientific and practical factors into a plan of soil and grass improvement which the Central Colorado District supervisors believe is unsurpassed.

WATER IN RESERVE.—An irrigation storage reservoir constructed by J. N. Ogle on his farm in the Otero Soil Conservation District near High Rolls, N. Mex., has proved its value in savings of water, time, and labor during the first year in operation.

Ogle recalls that he has been confronted with a serious irrigation problem for more than 40 years. The small stream which came from a spring made it necessary for him to spend as much as 24 hours on a single irrigation. Now, with the storage pond completed as a part of his soil-conservation farm plan, he can store enough water to irrigate at regular intervals of short duration. Ogle's pond holds 9 acre-feet of water and has been coated with 12 to 18 inches of clay to prevent seepage, and also has been stocked with fish.

Fifteen similar water-storage reservoirs have been built in the Otero Soil Conservation District under supervision of Soil Conservation Service engineers. With only small heads of irrigation water being available, these storage ponds are proving of great value.

GOOD BUSINESS.—Farmers' Day is to be an annual event with the Kiwanis Club of Prescott, Ariz., as a result of the activities of John D. Freeman, a Kiwanian and district conservationist for the Soil Conservation Service at Prescott. The first Farmers' Day was held on March 11, when each member had a farmer or rancher as his guest. Dave Heywood, a Phoenix businessman, was the principal speaker, his subject being "The Farmer's World Changes."

RANGE RESULTS.—Richard F. Thorley operates a 52,000-acre Hereford cattle ranch in the Iron County Soil Conservation District near Modena, Utah.

Back in 1940, Thorley came to the realization that his 1,500 sheep and 800 Hereford cattle were causing serious damage to his range land and that his enterprise wasn't paying off as it should. He sold the sheep and reduced his

cattle to 600 head. This still didn't bring the desired results, so in 1945 Thorley cut his cattle to 350 head, which was slightly below the estimated carrying capacity of his range.

Thorley has observed great improvement of both the range and livestock during the last 3 years. The calf crop from his breeding herd of cows 2 years and older has increased from 60 percent to 95 percent, and weights have gone from an average of 250 pounds to an average of 425 pounds. Mature cattle have increased in weight and are in much better condition throughout the year.

Thorley operates his ranch on a cow-calf-yearling basis, which, he says, permits greater freedom in making necessary adjustments to meet varying feed supply conditions. Under this plan the yearling steers are sold first; cull cows and bulls second, and finally, the steer calves. Thorley retains a breeding herd of young cows and replacement heifers, and plans to increase his herd to the optimum number as the range improves.

Management practices which Thorley has carried out in connection with his complete soil- and water-conservation program include fencing, water development, reseeding of barren areas, water spreading, better distribution of stock, deferred grazing to permit seed maturing and increased vigor of the grass, lowering of the stocking rate, and protection of denuded areas from grazing.

Thorley says he has observed the following results: Better condition of cattle the year round, more and larger weaned calves, increased production in dollars and cents per cow unit, increased vigor, growth and density of the better grasses and shrubs, and a decrease of water and wind erosion.

NORTHEAST



FARM POND PAYS OFF.—One of the speakers at the Allegany County, N. Y., Potato Show was Walter Brandes, a district cooperator, who reported on his farm pond.

This pond was built by the Allegany County Soil Conservation District in 1946. It was built for multiple use, to provide water for spraying potatoes, for irrigation, for livestock, and for recreation. The total cost was \$450. This included the time of the farmer, the materials which he supplied, and the equipment made available by the soil conservation district.

Formerly, Brandes had to travel down a steep hill at least a mile and a half to get the water necessary for spraying his potatoes. This water was pumped into the spraying rig and with considerable difficulty hauled back up to the potato plantings. Time studies now show a saving of 5 hours on each spraying of the 20 acres of potatoes. Brandes reported a total saving of 45 hours for man and equipment during the summer season, time which could be used for harvesting hay and other crops. Figured conservatively, basis at \$3 per hour for spraying rig and sprayers, this means a saving of \$135 per season.

Figuring the total cost of the pond at \$450, the saving in spraying time at \$135, and \$330 as the possible Government allotment toward construction of the pond, the entire cost of this job has been written off in one season's time. In addition to these benefits, Brandes feels that the pond will be valuable as recreation. Though the pond has not yet been stocked with fish, considerable use already has

been made. At the meeting Brandes exhibited snapshots showing full use on a Sunday afternoon, with half a dozen cars parked adjacent to the pond.

People were picnicking along the shore line. There were two boats on the pond, four individuals on inner tubes in the water, several others either in the water or about to get in.

CROPS DROWN NO MORE.—J. Sewell Radcliffe, Cambridge, Dorchester County, Md., states: "On one of our farms, the year before we put in a drainage system, we raised 10 bushels of wheat and 5 barrels of corn to the acre. It was a fairly normal crop year. The year after the drainage system was installed, we raised 18 bushels of wheat and 9 barrels of corn to the acre—nearly a 100 percent increase. We think we can build up our land to where it will produce even high yields."

W. D. Carroll, Ridgely, Caroline County, Md., says: "On one farm I drained a field of 25 acres which I could not grow a crop on at all. After draining, I grew 70 bushels of corn to the acre on this field."

C. Brooks Nagel, Preston, Caroline County, Md.: "In 1945 I raised 65 acres of cucumbers, which I sold for about \$12,000. Had it not been for the drainage project carried out by the soil conservation district, I feel I could not have saved more than half of this crop. My conservation program has already meant \$10,000 in cash to me."

R. P. Dennis, Berline, Worcester County, Md.: "My yields of corn, wheat, and beans have increased about 20 percent as the result of drainage and other conservation work. Another advantage is that I can plow and plant earlier in the spring and catch higher markets."

Mace LeCompete, Rhodesdale, Dorchester County, Md.: "Because of drainage system put on my farm, I was able to prepare the land and seed a pasture while other farms, not drained, were partly covered with water. My corn yield was considerably better than it would have been without drainage. The drainage project was worth \$1,500 to me in one year on my 200-acre farm, although my cash outlay was only \$142 for the work."

POTATO YIELDS UP.—Edward L. Kent, of Wellsville, in Allegany County, N. Y., owns a 200-acre hilltop farm near Andover, N. Y. For several years, he grew potatoes there in the conventional square field, up-and-down hill fashion. Then he noticed that he was losing topsoil. So he went to the Allegany Soil Conservation District for help.

He put in 875 feet of tile drain, developed 600 feet of sod waterways, and cleared out boulders with the district's bulldozer. Next, he constructed 8,200 feet of diversion ditches. All of his cultivated land—52 acres—is farmed on the contour.

In 1945, he got 17,000 bushels of high-grade potatoes from his 52 acres—an average of 327 bushels to the acre. Before beginning his conservation program, his potato yields averaged 32 bushels per acre less than they do now.

BENEFITS FROM FARM PLAN.—"My soil conservation plan has meant a great deal to me in the operation of my farm," says J. Albert Sutton, Kent district, Chestertown, Md. "Proper land utilization enabled me to remove from cultivation those parts of my farm which were unsuited for cultivation. Putting those unfit areas into permanent pasture, long term hay, and trees has enabled me to apply better management to the rest of my farm."

"Proper crop rotations, proper tillage, and proper land utilization have enabled me to increase my corn yields 20 to 25 bushels per acre, and my small grain approximately 8 bushels per acre. Through a balanced farm plan I have increased the livestock carrying capacity of my farm by providing adequate grain, hay and pasture for my stock."

"Trees planted in 1941 have made excellent growth and will in a few years give me an economic return from land that previously had no crop value."

NURSERY CUTS PLANT LOSSES.—The Perkins-deWilde nursery near Shiloh, in Cumberland County, N. J., has applied soil-conservation measures on 300 acres of its 500-acre tract. Roeland deWilde, manager, believes that such measures as contour planting and installation of diversion terraces have cut plant losses by 90 percent. Before the conservation program started in 1941 plant losses averaged as much as \$5,000 a year.

The Perkins-deWilde nursery is a branch of the Jackson-Perkins Co., which also operates nurseries in Indiana, California, and New York. It is in the South Jersey Soil Conservation District.

DIVERSION TERRACES.—Eugene Mattison, farmer and businessman of Otto, N. Y., in Cattaraugus County, spent \$56 for a diversion terrace and rescued 8 wet acres. Now, because of this diversion, he has dependable crops of corn and oats. He estimated that his \$56 investment netted him \$250 in one year.

Another Cattaraugus farmer, Louis Lange, found that three diversion terraces made a lot of difference on his farm. His 56 acres of cropland and 65 acres of pasture had suffered at one time or another from heavy rainfall. Before putting in his diversions, he cared for 16 head of cattle—but he had to buy some hay. His fields were gullied; his corn fields often were too wet. After installing the diversion, he not only raised enough hay for his own cattle, which now number 30, but also sold 45 tons to his neighbors.

\$50,000 NET GAIN.—Nineteen farmers in Ontario County, N. Y., cooperators in the Ontario County Soil Conservation District, spent \$9,000 to drain 140 acres of muckland. They had to build 4½ miles of outlet ditch. Net gain to the farmers the first year was \$50,000. One farmer, Walter Stewart, reported that his drained land had increased in value by at least \$100 an acre.

SOUTHEAST



PROFITABLE GULLY.—“One of my most interesting experiences with the Soil Conservation Service occurred in Noxubee County, Miss., in the fall of 1942,” reports Joe G. Stevens, soil scientist, Valdosta, Ga. “The planning technician in Noxubee County had asked me to map several farms in a certain community. I got my maps together and soon arrived at my destination. In order to get a check on the property lines, I started looking for one of the property owners. I found him in a field near the road chopping cotton. I stated my business and he pointed out certain property lines.

“As I started to leave, he said, ‘Mister, it’ll cost you 10 cents to go into that piece of land.’ I asked him what the charge was for, and he said, ‘Why, we’ve got the biggest gully in there for miles around. School children come out here every year to look at that gully. We charge 10 cents a head, and we can’t make an exception for Government men. We are sure proud of that gully.’

“I asked him then if he didn’t think he should try to stop it from washing. ‘Stop it from washing! Why man, you must be crazy. Some years we make about as much off of that gully as we do off our crops.’

“So I paid him the 10 cents and charged it up to experience.”

UPPER MISSISSIPPI

MICHIGAN SCHOOLS BUSY.—Every work group in Michigan continues to report increased activities by schools lying within the boundaries of soil-conservation districts. These activities consist of:

Tours by teachers and children to farms with soil-conservation plans.

Classroom instruction, including activities such as making clay models of gullied fields and fields with control methods established, as well as large cardboard wall write-ups of conservation activities.

Several county school commissioners have established contests on making wall exhibits with conservation pictures.

In several districts high school teachers and district directors are meeting and planning the most effective way of injecting conservation education into high school curriculums.

County school commissioners are asking for teacher-training activities for the purpose of aiding the teachers more effectively in teaching conservation in their schools.

RURAL SCHOOL COURSES.—The committee working on the Iowa State rural school course of study in science (see “Conservation in the Classroom” in this issue), has developed three additional courses of study outlines as follows: (1) Water conservation; (2) conserving nutrients in the soil; and (3) biological balances. To date this committee working under the direction of Miss Jesse Parker, State superintendent of schools and Miss Ivah Green, rural supervisor, have developed nine units of conservation that are now being taught in connection with rural school science courses. Miss Parker plans to call this committee together in January 1949 to revise the rural school science course to include the units on conservation in the regular course of study. Kenneth King, assistant State conservationist, Soil Conservation Service, participated in the work of the committee.

MINNESOTA MESSAGES.—The East Fillmore, West Fillmore, and Upper Zumbro districts of Minnesota are now printing quarterly letters which they send their co-operators. The boards of these districts think that such letters will help them to keep in closer touch with farmers who have signed agreements with the district. The Upper Zumbro quarterly letter is financed by three banks in Rochester. The East Fillmore District paid for its first letter which was sent out in August. The second one was paid for by the First National Bank in Rushford. Banks of some of the other villages of the districts will pay for future quarterly letters. The West Fillmore District also paid for its first letter. The second one is being paid for by the Spring Valley Commercial Club.

WILDLIFE PLANTINGS.—The Iowa State Conservation Commission has developed a plan for developing wildlife plantings in soil conservation districts. The plan provides that the State conservation commission will furnish funds to match funds raised by the local conservation clubs to carry out projects on farms of cooperators or on public land in the soil conservation district. The approval of the soil conservation district commissioners of all such projects is required by the State conservation commission. A number of district commissioners have met with sportsmen’s clubs and have inaugurated plans to carry out a program of wildlife plantings under the program. The Carroll County District, Hardin County District and the West Pottawattamie County District commissioners recently voted to cooperate with the conservation commission in the cooperative plan.

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CHIEF, SOIL CONSERVATION SERVICE

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WELLINGTON BRINK

Editor

Art Work by

W. HOWARD MARTIN

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OUTDOOR LAB.—Dates for the Ohio Conservation Laboratory are June 21 to July 28. Place is Camp Muskingum, at Leesville Lake in Carroll County.

The "laboratory," which has been held each summer for several years, aims at combining study and recreation in outdoor surroundings. It offers to school teachers, college juniors and seniors, and others a 5½-weeks conservation course sponsored by The Ohio State University in cooperation with the State Department of Education and the Ohio Division of Conservation and Natural Resources. The University allows for completion of the work 8½ quarter-hours of graduate or undergraduate credit. Considerable attention is given to soil and water conservation, and it is a practice to visit the local soil conservation district.

Charles A. Dambach is director. Inquiries should go to D. H. Eikenberry, chairman, Department of Education, Ohio State University, Columbus 10, Ohio.



FRONT COVER.—After a single 5-hour rain, these lister furrows were filled with eroded soil to a depth of 2 inches or more. Some of the furrows washed out completely to a depth 12 inches below the adjacent ridges. If this serious erosion is allowed to continue at the present rate, the field will be of no further value for practical cultivation by about 1960. A sound conservation program would protect it and keep it in production. The photograph was made in Cottle County, Tex., in May 1947.

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There's Cash *IN* **THOSE WOODS**

By HERB BODDY

Changing from "cut as you go" to "crown thinning" put R. C. Heilman in line to cash in on the lucrative rough lumber market in northwest Washington. Here he measures a fallen second-growth tree marked for harvesting under his selective-cutting plan.

PASS LAKE, a mere dot on the map and long a haven of anglers, has achieved new distinction as the center of a teeming farm woodland milling industry.

A chugging, pocket-sized sawmill, cutting rough lumber at the rate of 2,000 feet daily, is noisily changing the stark quietude of the forested watershed near Deception Pass State Park, in Skagit County, Wash.

Resourceful, conservation-minded E. C. Heilman, Seattle plumber, who played a hunch and switched to lumbering 4 years ago, has found in his 560-acre timber holdings an opportunity to mix pleasure with business.

A member of the Skagit Soil Conservation District, Heilman is doing double duty as lumberman and cattleman on his ranch 9 miles south of Anacortes. But his biggest stock in trade today is his interest in logging 500 acres of woodland the conservation way.

When Heilman purchased three-fourths of the timber surrounding Pass Lake, in the spring of 1943, he was, as he says, "green as grass about the logging business."

NOTE.—The author is an information specialist, Soil Conservation Service, Portland, Oregon.

"I put my money in trees," Heilman explained. "I figured logging was my best source of income."

He bought a bulldozer, started felling, barking and yarding his timber. Mount Vernon and Anacortes mills took all the logs he could haul. With building booming, Heilman's logging enterprise began making money from the start.

After 2 years of logging his old stands, Heilman began to wonder whether he wasn't cutting the frosting off his holdings.

"It occurred to me," he points out, "that I couldn't make money year after year off my holdings, cutting logs at random. I figured there must be a better way."

Heilman talked things over with the supervisors of the Skagit Soil Conservation District. The governing body turned over Heilman's case to technicians of the Mount Vernon office of the Soil Conservation Service.

Bill Tinney, forester, and Austin Summers, field technician, went over the acreage carefully with Heilman. By changing his logging methods to a sustained yield basis, it was shown that Heilman's timber holdings could be made to produce more profitably under a long-range program of woodland management.



Heilman, once a Seattle plumber, at work in his mill. Two thousand feet of rough lumber are produced daily.

As the first step, Heilman set up a 5-year test area. Service field men marked the trees for selective cutting. Instead of felling the smaller trees first, as he had been doing, Heilman tried logging out his biggest firs and cedars.

The system, known as crown-thinning, opens up the woodland, giving more growing room for smaller, immature trees.

By year's end, Heilman's small trial area worked out so well that he decided to put his entire 500 acres of woodland on a sustained yield basis. Then, convinced it was time to branch out, he bought a sawmill for \$6,000 and began rough-sawing his logs for market.

Besides the 2,000 feet of rough lumber milled daily, Heilman has found a ready market for several forest by-products. His sawdust is sold as hog fuel and bedding material. He markets his slab and other waste timber in nearby towns for fuel and stovewood. Summer home dwellers buy his bark for their fireplaces.

But Heilman will gain other benefits from his use of woodland management methods. By controlling the cutting of timber, he will provide a protective cover for the Pass Lake watershed. If his holdings had been clean-cut, logged off and

burned, he would have been troubled by both soil and water losses.

Runoff on a barren watershed is heavy, and usually is accompanied by serious soil damage. With little vegetative cover, the natural fresh water springs, which comprise the main source of supply of Pass Lake, would run dry in summer. Now that he has his farm conservation plan in full swing, Heilman can "farm" his tree crop, and at the same time practice soil and water conservation.

On off days, Heilman lays aside his logging outfit for the plow. Of the 60 acres now under cultivation, 30 were cleared by Heilman the last 3 years. His plan calls for clearing 100 more acres for hay and pasture this year and next.

As a cattleman, Heilman is no "boots and saddles" rancher. In plumber's attire, he is dressed for lumbering or stockraising. His present herd of six polled herefords will be increased to 40.

Summing up his beef cattle venture, Heilman said, "I'm counting on my beef stock to open a second crop production front for me. I believe it will boost my income from lumbering considerably."

For recreation, Heilman expects to do a little fishing on the side, when Pass Lake opens again. It's just two jumps and a scamper from mill to lake.

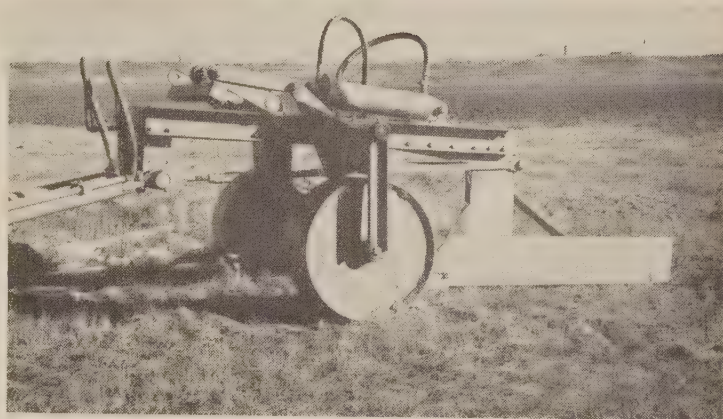
ONCE-FLOODED LAND YIELDS BUMPER CROP

By MARION H. WEAVER

IN 1921, more than a quarter of a century ago, the Arkansas River went on a rampage in Southeastern Colorado. When the floodwaters subsided, 52 acres of what is now the Ryan brothers' 400-acre farm, 3 miles northeast of Rocky Ford on the north bank of the river, were covered by 2 feet of sand and gravel. Productivity was considered destroyed, and, as years went by, a dense grove of cottonwood trees grew over the debris.

In the summer of 1946, the owners, James Ryan, his son Millard, and three nephews, Ted, Phil, and Fred, became interested in a soil- and water-conservation program for their land. They entered into an agreement with the East Otero Soil Conservation District and received the aid of Soil Conservation Service technicians in planning their program.

In an effort to restore the 52 acres of flood-ruined land to profitable production, a bulldozer was used first to uproot the trees; many of them were used as riprap to protect the river banks. The Arkansas River forms the south and west boundaries of the field. Next, the technicians planned for the leveling and the installation of an irrigation system. After carry-alls had been



This 30-inch moldboard plow was used to mix the flood debris with buried topsoil.

used for the heavy dirt-moving, a landplane owned by the district was used to finish the leveling job. Then a well was drilled and an electrically operated pump installed to provide irrigation water.

Finally, since the soils survey had shown that the original moderately heavy soil had been covered by around 2 feet of sand and gravel during the 1921 flood, a 30-inch moldboard plow was used to mix the buried topsoil with the covering debris.

The 36 acres in the southwest portion of the 52-acre field were planted to corn in 1947. The yield averaged 60 bushels to the acre. The remaining 16 acres, being more sandy, were seeded to sweet clover with a nurse crop of oats. This will be turned under for green manure.

NOTE.—The author is district conservationist, Soil Conservation Service, Rocky Ford, Colo.



Ryan orchard produces large variety. Crops are in rotation, with frozen cantaloupe balls marketed as a specialty.

The cost of clearing, leveling, and installing the irrigation system on the 52-acre field was approximately \$5,000. Returns from the first year's crop on 36 reclaimed acres approximated \$4,000—about 80 percent of the entire investment.

In carrying out a soil- and water-conservation program on the entire 400-acre farm, the owners will follow a crop rotation of small grain, corn, cantaloupes, and onions with sweet clover for green manure. Some sheep are kept and the manure is being spread on the cropland in addition to commercial fertilizers.

Three excellent spring-fed ponds have been developed on the north end of the farm, and have been stocked with fish. Immediately adjacent to

the ponds is an orchard which produces a wide variety of fruits and consequently attracts many species of birds. The fish pond and orchard area provide an attractive spot for sport and recreation.

The Ryan brothers' farm is one of the larger producers of quality cantaloupe seed in the Arkansas River valley, these being sold widely over the United States. In 1946, Phil Ryan organized the Rocky Ford Food Products Co., which specializes in the production and wholesaling of frozen cantaloupe balls. This product is proving very popular with hotels and restaurants and several carloads have been shipped during the last 2 years.

INTER-AMERICAN CONFERENCE.—The Government of the United States, at the request of the Pan American Union, will serve as host to the Inter-American Conference on Conservation of Renewable Natural Resources, to be held at Denver, Colo., during September 7–20, 1948. This conference, the first international meeting of its kind on conservation, is for the purpose of considering problems involved in the conservation of renewable natural resources in the Americas, and to discuss recent technical developments on this subject. It is being organized pursuant to a resolution adopted at the Third Inter-American Conference on Agriculture held at Caracas, Venezuela, in July 1945.

Among the problems to be discussed will be those arising out of deforestation, soil erosion, overgrazing, wildlife destruction, floods, and failing water supplies.

The conference will consist of a series of meetings to discuss conservation problems, together with field trips to study land management practices. The delegates will have an opportunity to view at first hand soil conservation districts, forest and range experiment stations, the Rocky Mountain National Park, and other places of interest. Irrigation projects will be studied, along with their relationship to agriculture, grazing, and forestry practices on the land from which irrigation waters are derived.

... to the Four Allies are opened the gateways of an opportunity to bless the whole world as never before. Beyond the murk and rubble of the war; beyond the last, bleak resting places of millions of heroic men; beyond the razed homes and shattered towns of 'the quiet people'; beyond the scorched acres and barren fields; beyond the famines and their reign of death; beyond all this horrible orgy of life-destruction, is seen the vista of the living earth as the source of the reconstruction of terrene mankind. At the gateways stand sentinels awaiting the password—**THE SOIL.**—From "Reconstruction by Way of the Soil" by G. T. Wrench.

Although the conference will be a technical one with no power to negotiate agreements, it will consider national and international action for the conservation of renewable natural resources and their optimum use on a sustained-yield basis.

The working sessions of the conference will be divided into sections corresponding to the sections of the program. One of the sections, "Renewable Resources and International Relations," will be led by Ernest Holt of the Soil Conservation Service.

DEATH OF ALDO LEOPOLD.—On April 21, while fighting a grass fire near his summer home not far from Madison, Aldo Leopold, 62, professor of wildlife management at the University of Wisconsin, died of a heart attack.

Leopold was best known, perhaps, for his contribution to wildlife management. His "Game Management" published in 1933, has never been superseded as a textbook in this field. His many other publications, both technical and philosophical, have added dignity and stature to the wildlife management profession. Trained in forestry, Leopold was also well known in this phase of conservation, especially for his work in the Southwest, where he spent many years.

His interest in soil and water conservation was significant. In 1921 he wrote, in the *Journal of Forestry*, an article calling for erosion control as a part of forest policy. In following years he wrote other articles on forest erosion control, and in 1924 he made an erosion survey of the National Forests of the Upper Gila. He was one of the first to point (in 1931) to the value of erosion control operations for improving habitat conditions for wildlife.

Leopold was the recipient of the Hornaday Medal for Distinguished Service to Conservation, the Outdoor Life Gold Medal, and other honors. In 1934, he was appointed to the President's Special Committee on Wildlife Restoration.

Aldo Leopold's sound thinking, his brilliant writing, and his personal influence have made a permanent mark on American conservation.

SOIL EROSION AND GRAPES.—Soil erosion is responsible in many instances for the prevailing differences in characteristics of surface soil in a given area, state R. B. Alderfer and H. K. Fleming, SCS research, State College, Pa. The extreme variability in productivity of different vineyard plots studied was very closely associated with the soil characteristics as they varied from one plot area to another.

* LIVE SOILS ARE RICH IN HUMUS

An Agronomist Chats About Farming With Some of His New England Friends

By GROVER F. BROWN

ACCORDING to the 1946 issue of Agricultural Statistics New Hampshire's 1934-43 average production of commercial truck crops was about 2,000 tons. This production represented a farm value of some \$36,000, which was equal in value to the same crops produced by the State of Kansas and over five times the value of the commercial truck crops for processing in Arizona. So, you see, the size of a State isn't everything and New Hampshire has some thing to make up for its lack of size.

The State's apple production for the same period was 733,000 bushels marketed. Of course, bad luck dropped the production way down in 1945, but the higher price received made up much of the difference. That is still about as many bushels of apples as Kansas produced, and about three times the number of bushels produced in the great fertile State of Iowa.

If you are planning to set out a new block of fruit trees or increase your acreage of truck crops, one of the first things I would suggest is that you look at your soil. Once you plant your apple trees, they should be there for the rest of your fruit-growing life. You can shift your vegetable acreage around to better soils if you have any, but you can't move your orchards from field to field every year or so. You can now get from the Soil Conservation Service, through your local soil conservation district, a land use capability map of your farm. This map will show you what kind of soil you have in each field on your farm, and the capabilities of your soils to produce permanently under a conservation system of farming. It will also give you a lot of other information, such as the depth of your soils, both topsoil and subsoil; the drainage conditions both on and in your soil profile, and the kind of a root zone your trees or vegetable crops are going to have. Therefore, my suggestion is, don't do any new planting without getting all the available facts about your soil. Maybe you can't acquire any other land than you now have, but you should know what is on and

below your soil's surface, so that you can understand what your future soil-management problems will be. This service is free, so don't fail to take advantage of the opportunities available through your soil conservation district.

In setting out a new orchard on sloping land where run-off is likely to be a problem, it is well to look closely at your tree layout. Contour planting, with of course a complete water-disposal system, should be the primary consideration after selection of soil and site. Contouring is being accepted by growers who fully understand the benefits. They also fully understand some of the disadvantages of contour planting, but when they total the score sheet the advantages outweigh the disadvantages. It is generally true that you can't get something for nothing. You can't farm steep lands without its costing you something, even though you make a good return on your investment. Contouring is not a new practice in agriculture; it is almost as old as agriculture itself. If the practice were not sound it would not be used wherever agriculture is sound and permanent. Here again, your soil conservation district can arrange for technical service from the Soil Conservation Service.

Wherever there is soil erosion, the land is being misused. Erosion in itself is an admission that we are not treating the land right. If you saw a horse or cow starving to death in a lot with no feed you would feel badly because they were being mistreated. When you see land that is poor and starving, you feel badly, too. To mistreat land is even worse than to mistreat animals. Badly treated land can mean sure death to animals, men, and nations.

Once you have gathered the facts about the capability of your land; have determined varieties, and method of planting, and disposal of surplus water, you come to the most important factor in making a soil really productive. This factor is organic matter. I know that all of you are aware of the importance of the organic content of a soil. But maybe you haven't gone quite far enough in this direction.

We don't really know what we could do with a mineral soil of say 8 or 10 percent organic mat-

NOTE.—The author is Chief, Agronomy Division, Soil Conservation Service, Washington, D. C.

ter. With even half that amount we would be better off than most fruit and vegetable growers. In fact I doubt if the average commercial vegetable grower has over 2 or 3 percent organic matter in his soil.

We who are working in soil conservation know that if our soils have the proper structure there is a chance to get free water movement, both into and through the soil. If the structure is lost, and the soil runs together like cement when it is wet and cracks open when it is dry, there is not going to be a big fruit or vegetable crop. It has been said that when we lose the proper size of soil aggregates we have lost soil's productive powers. Of course, soils vary all the way from the silts and clays to coarse sands in sizes of particles—but a plentiful supply of organic matter can improve the structure of any mineral soil.

Mineral soil full of organic matter, or humus, is live soil. The soils that produce our best crops are full of bacteria and other soil organisms essential to fertility. I don't think we know how valuable a heavy organic content can be. I know of no experiment station that has a test to show what can be done with a mineral soil of 8 percent organic matter as compared with one having only 3 or 4 percent. We have thought that perhaps 3 or 4 percent is all that we need or can have under practical farming conditions. We haven't tried to find out what can be done with a soil full of humus, irrespective of cost. We have taken the position that the cost would be too high, and let it go at that. We may have an experiment station in New England that has some real data on how to maintain a mineral soil at anywhere near 8 percent organic matter but I doubt it. If we had, I'm sure the result on crop yields, to say nothing of the quality of those crops, would have been so high that we all would have heard about it.

There has been a lot of talk about getting more organic matter into the soil, but our research hasn't yet told how to do it. Sure, we recommend the growing of cover crops, and with apples here in New Hampshire we can do that in continuous sod. But how about our vegetable and crop farmers? After you take off a crop of late vegetables you don't have very much time, if any, to get a cover crop started before cold weather. Some way or other we must contrive to go farther than the growing of annual cover crops, or increasing the length by a year or so of the hay in the rotation. We need information as to how to make compost

materials out of wastes, where to get more of such materials, and what value such materials can be to our soils and to our crops. Let's get the facts. Once armed with the facts, it should not be difficult to determine the price we can afford. Such research will need to be on a broader scale than small plots or greenhouse and laboratory studies, but surely there must be some place in this big country of ours where field-scale research can be pursued.

In the meantime, what more can we do with our cover and green manure crops? While an orchard is young, there is an excellent chance to work in a number of cover crops. If we inter-crop the orchard during these early years our opportunity for building up organic matter is gone, and our trees go into their fruiting stage in a soil poorly equipped to produce top yields. Here in New Hampshire we have a number of good legumes useful for soil improvement. Your choice will depend upon whether you want an annual like soybeans or cowpeas, or perennials like red and alsike clovers or alfalfa, and on the availability of seed. Ladino clover is excellent as a permanent cover crop and might very well be used with timothy or orchard grass. Such covers can be grazed a little if desired, or they can be mowed and left for mulch. It is sound practice to cultivate along the tree row for a few years, using the mulch produced in the middles for covering around under the little trees.

In any system of permanent covers or mulches, there is the mouse problem to contend with. By using poisons and by keeping the mulch from getting too close to the tree trunks, you should be able to handle this problem. For a short time after a dry mulch is placed in an orchard you will want to take precautions against fire, but there is practically no fire hazard in green or well decomposed mulches. Mulch should be kept on or near the surface. There's no need to plow a cover crop down under 6 inches deep. Feeder roots are near the soil surface when oxygen and fertility are plentiful. Deep disking or plowing serves to cut these feeders off and force the tree roots into less fertile soil layers in search of nutrients. Mow your covers and leave them on the surface. If you must use a disk, set it straight and run it lightly. It can be a damaging tool and do far more harm than you realize.

Commercial fertilizers carry recommendations

(Continued on page 259)

They Put a Halter on **Ol' Man River**

These jetties of wood piling, spaced around a sharp turn in Humptulips River, are designed to slow the flow and protect the adjoining farmland from bank damage. The swift cutting edges of the streams of Grays Harbor County, as they twist and turn through the countryside, present an awesome scene from the air.

IN THE GREEN DAIRYLAND bottoms of Grays Harbor County, Wash., alert farmers are putting a \$1,500,000 halter on the rampaging, erosion-bent Chehalis river and its tributaries. Cracking down on one of the State's meanest soil "chisellers" is aimed at saving more than 65,000 acres of top farmland.

The current riverbank control program is a move by county, State, and Federal agencies, working closely with farmers, to mend Ol' Man River's ways. It is one of several postwar, soil-saving construction jobs on the timetable of the members of the Montesano-Oakville-Elma Soil Conservation District. Work now under way reshapes stream-bank control measures, developed up to 1941.

To protect the banks of farmland in the Chehalis Valley, 1948 style, a sum of \$46,000 will be earmarked annually during the next few years. Funds are supplied from the 1-mill county river improvement tax levy and State flood-control matching allotments.

Soil Conservation Service engineers estimate that from 50 to 100 acres of the county's best pas-



Leaders in river control: C. Tab Murphy, chairman, Grays Harbor county commissioners; G. H. Ridder, district conservationist; H. S. Swenson, chairman, Montesano-Oakville-Elma Soil Conservation District; E. A. Lewis, work unit conservationist.



The meandering Cowlitz River has cut deeply into the south bank of the Jacoby farm, near Toledo, Wash. Fifty-three acres have been lost since 1933. Five of the twenty acres lost in 1946 were of Class I, or top crop and pasture soils.

ture and crop lands are being washed downstream to the Pacific Ocean each year. The river bank erosion is heaviest between November and May when the swift-flowing Chehalis makes its deepest cuts in farm acreage along the stream's meandering course. Banks of several other Grays Harbor rivers, the Satsop, Humptulips, Wishkah, Hoquiam, and Wynooche, also considered highly erosive, are included in the plans.

Grays Harbor, with a 60- to 90-inch annual rainfall, is pointed out by G. H. Ridder, district conservationist, as one of western Washington's major river "trouble" areas.

Along the banks of the Chehalis, are many signs of the cutting power of the river's flow. Old landmarks are disappearing, as the river, turning and bending through the countryside, washes away huge chunks of crop and pasture land.

On a bend of the Satsop, which flows past the William Wharton farm, the river has etched a one-half mile notch from the rich bottomland and the waters are only 500 feet from the rancher's home site.

Grays Harbor's river bank project is being jointly developed by the Soil Conservation Service, the Washington State Department of Conservation and Development, and the Grays Harbor

county commissioners. The farmer-managed soil conservation district is cast in a coordinating role.

Harry Swenson, district governing board chairman, who owns a 91-acre dairy ranch near Elma, described the movement as "the farmers' way of fighting river encroachment."

"We have to live with the river and its tributaries," he said, "so we're trying to get along together."

R. B. Miller, SCS engineer attached to the Chehalis district office, planned the structural features of the river-control program. Slowing down the river at the turns and protecting its banks from soil erosion will require construction work extending over a period of years.

River improvement work, now being carried out by county crews under the direction of Eric Anderson, includes construction of a series of jetties and abutments, plus a considerable amount of riprapping. Work includes both new structural projects and maintenance and repair of prewar construction.

Using bulldozer, and crane, piledriver and dragline, the crew of three to five workmen, under Anderson, is employed the year-around building new stream-control projects and repairing old soil-saving structures. Since the crew began its

work last June, it has tackled a total of seven erosion jobs, taking up each project in the order of its damaging effect on crop and pasture lands. Soil conservationists explained the increased amount of erosion of the county's rich dairy lands in recent years as being partly due to heavy logging of headwater forests.

Grays Harbor river-bottom lands produce nearly all of the dairy products which make up the county's agricultural backlog. The increasing importance of riverbank protective measures has established the erosion program on a permanent basis. Engineers of Federal, State and county agencies, cooperating in the work, pointed out that new construction jobs, such as building of jetties and stream-bank riprapping, will require year-long maintenance.

LIVE SOILS ARE RICH IN HUMUS

(Continued from page 256)

all the way from none to one-fourth pound of nitrogen, for each year of age of the tree, to 1,000 pounds per acre of a 2-12-6 or 3-12-12 or some similar mixture. Choice of fertilizer, and the amount, will depend more upon the quantity of humus than on any other single factor. Fertilizers and lime can be helpful in building up large quantities of organic matter, and in my opinion that is one of their greatest values. If you don't have a soil well filled with organic matter your chances of having a high-producing, long-lived orchard are pretty slim.

Certain fruit and vegetable diseases can be traced to low soil organic matter or humus. Prof. M. A. Blake, of New Jersey, has said that the application of one mineral nutrient alone, such as nitrogen, potash or phosphorus, fails to improve young peach trees that appear to be affected by "little peach." However, application of well-rotted manure or leaf mold has brought rapid recovery. This means only one thing, that the soils were so deficient in humus that a really healthy tree couldn't exist. A plentiful supply of humus in the soil will help keep your trees healthy. There are many similar examples of diseases in fruits and vegetables traceable to growing them on soils low in humus.

Poor drainage may be caused by a hardpan layer that prevents the free downward movement

of water, or it may be the direct result of not having any place, such as a suitable outlet, for surplus water to drain away. Poor drainage sometimes is the direct result of poor soil structure. Sometimes poor surface drainage is the result of surface sealing caused by rain pounding unprotected land. This can be improved by keeping the land surface covered with growing cover crops, residues or mulch materials. A mineral soil kept high in humus is freely permeable to moisture, thus allowing for free entrance of water and free movement of water through and out of the soil. It is folly to worry about drainage and then disregard soil structure and the value of a high organic content. Removal of excess water is often a first necessity in wet soils but it is only one step. The real cure must include lots of organic matter and farming methods which continue to keep the soil full of organic matter. I'm sure you have all seen wet soils benefited by surface and tile drains. How many of those soils were high in organic matter? I'm of the opinion that most of the hillsides needing such drainage were very low in organic matter and that their agricultural value after drainage will stay low without adequate amounts of organic matter. You can get help from your soil conservation district on drainage but it is your responsibility to put organic matter into your soil and keep it at a high level.

In conclusion, may I say that attention paid to fundamentals such as capability of your soil, planning for safe disposal of surplus water either from your own land or any that may be coming from your neighbors, plus all the organic matter you can get before you plant a new orchard will largely determine your profits and length of life of your orchard. The Soil Conservation Service through your soil conservation district can tell you the capability of your soil for orchard or vegetable purposes. We can also help you with your water disposal system, and together with the other folks working through your soil conservation district, will help you plan to get the greatest possible amount of organic materials in your soil.

I have enjoyed being back here in New Hampshire with you again, and sincerely believe that as you continue to work together on your common problems, your progress during the years ahead will be greater even than the progress you have made, toward soil conservation during the last few years.

Soil Erosion in Scandinavia

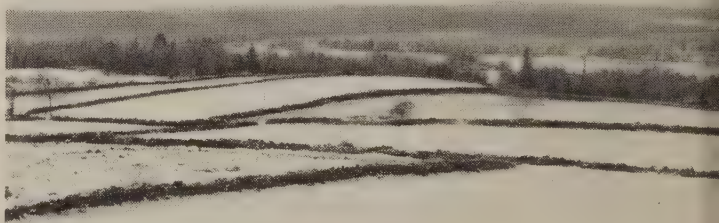
SCANDINAVIA has nearly all types of topography, soils, erosion hazards, and degrees of erosion. There are soils subject to wind and water erosion, and there are winds and rainfalls intense enough to erode them.

At one place in Denmark the average annual precipitation varies from 20 to 30 inches, and during the years 1911-27 there were 7 storms with an intensity of over 2.8 inches per hour for a 5-minute period. Such storms, and others of lower intensity but generally longer duration, can be destructive.

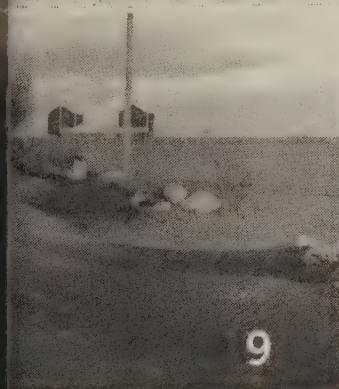
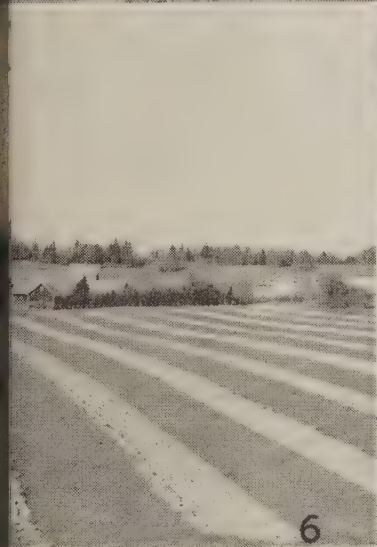
(Continued on page 262)

1. Typical erosion in early 1947. Holmby, Sweden. (Photo by courtesy of Ph. Wolf.)
2. Washout of Harlösa Brook of the Kävlinge River system, Sweden, 1947. (Photo by courtesy of Ph. Wolf.)
3. Soil left after melting of snowdrift next to snow fence. It was probably loosened and carried by strong winds of February 27, 28, 1947. Staviaby, Sweden. (Photo by courtesy of Ph. Wolf.)
4. Farmland and forest near Månstadskulla, Västergötland, Sweden, 1947. The snow silhouettes the numerous stone walls. Fence rearrangement for conservation farming would be difficult in an area like this.
5. Fields in background show up-and-down plowing; Sweden, 1947.
6. New orchard planted in furrows running across the slope; south of Granna, Sweden, 1947.
7. A natural terrace of soil retained by a 4-foot wall; Röldal, Norway, 1947.
8. Two-foot step built by water-transported soil; Skåne, Sweden, 1947.
9. The wind's work, Ugerup, Sweden, 1941. (Photo by courtesy of G. Petersson.)
10. Discards from a sawmill protect tobacco; Nymö, Sweden, 1943. (Photo by courtesy of G. Petersson.)
11. Damage from the runoff of a storm in July 1937 in southern Sweden. About 6.3 inches of rain fell within a 3-hour period, according to Professor Mattson, of the Royal Agricultural College, who supplied this picture.

NOTE.—The author is studying on a fellowship in Sweden. He was for 2½ years with the Soil Conservation Service. Previous to that he was employed by the Forest Service, part of the time in Alaska. His headquarters are in Uppsala 7, Sweden.



navia .. by Vernon Hahn





Small erosion "fans" in a young orchard in Denmark, in the vicinity of Slagelse.

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In Sweden the average annual precipitation ranges from about 38 inches near the southwest coast to about 20 inches on the east coast. In July 1916 the Stockholm area experienced an intensity of 11.99 inches per hour for a 5-minute period or 6.54 inches per hour for a 10-minute period or 4.44 inches per hour for a 15-minute period. This was an exceptional cloudburst but an intensity of about 3.5 inches per hour for 10 minutes is not unusual. This last figure indicates what can be expected, as revealed by the records of 1909-18.

There is steep farmland in Scandinavia. In several places in Norway the hay is transported by cable and gravity from the mountainside direct to the hayloft further on down the slope. There are areas of long, gentle slopes subject to sheet erosion similar to that observed in the flat country of central Illinois. Most arable soils are derived from granites and gneisses and are either sedimentary or moranic in origin. The sandy areas have a variable complement of silt and clay and show a corresponding difference in texture. These areas are very susceptible to high-intensity rains, while the clay and silt loam soil areas are probably more susceptible to rainfalls of lower intensity but greater duration. To summarize, it can be stated that Scandinavia has the soil, topographic, and climatic factors conducive to excessive erosion under the existing practice of agriculture.

There are several symptoms of soil erosion, such as the naturally formed bench terraces. Sometimes 2 feet high in southern Sweden, they were built up gradually from soil caught by the grass in fence rows set perpendicular to the slope. Further observations reveal rather extensive sheet

erosion but little drastic gullying. Sheet erosion may be compared with a slow, insidious disease: each storm carries away a little topsoil and each subsequent tillage tends to cover up the evidence. But cultivation or plowing cannot make new topsoil and will not make heavier subsoils easier to farm. Nor will it remove the stones which increase in number with each eroding season. In some regions, especially strengthened farm equipment must be used to farm the stony soils, made stonier every year through abnormal sheet erosion.

Some farm areas have open ditches running straight up and down hill, in the same direction crops are planted. These ditches probably started as dead furrows, and deepened and widened with every runoff. Little attempt is made to regulate surface runoff to the advantage of soil, crop roots and underground water supply. Fertilizers, organic matter, time and labor are wasted. The material carried by runoff water is either lost into the river system, or it settles out on bottom land which is fertile enough already.

Stavanger, Norway, had a heavy continuous rain on September 8, 1947, which cut miniature gullies in fields and gravel roads. Further inland from Stavanger there are steep slopes which have stone walls 3 to 4 feet high filled on the uphill side with soil washed from potato patches. These slopes are rocky and subject to serious erosion but there still remains some soil worth saving.

One farm north of Horsens, Denmark, appears to have a field-strip-crop system. The farmer works across the slope because he considers that to be the practical way, and he divides his lands into 8 fields for the rotation of turnips, barley, oats, and clovergrass. In spite of these simple conservation measures, erosion continues. Runoff waters from a thaw and storm of March 1947 cut a 2-foot gully through the center of the fields and the sound of the running water could be clearly heard in the farmhouse a long way off. The farm plowed in the gully but left it unprotected. It was suggested that he make a grass waterway and use narrower strips—but he regarded the soil losses as insignificant.

Improper land use is the main cause of excessive erosion. Improper land use may also be a serious factor in the reduction of crop yields and the lowering of the watertable in dry periods. One authority states that lack of water during the

summer limits plant growth in many parts of middle and southern Sweden, especially along the east coast. The summer of 1947 was dry and lake levels fell to a record low. Electricity and water had to be rationed in certain places. On one farm the watertable dropped so low that the cows had to be watered at a stagnant brook in the valley flat, a long way from the barn. The farm is located in a region partially forested and with such a high water-holding capacity that it was surprising to see the watertable drop so low. Maybe the drought revealed a weak point in the water relationships of that region, just as an unusually heavy cloudburst tests the effectiveness of soil and water conservation measures. A planned watershed-control system helps maintain a constant watertable. For example, in the upper Mississippi River area there is a small watershed with a year-round trout stream which once ran dry in the summer, before water and soil conservation measures were applied to the watershed.

On a farm in Denmark the potatoes were planted diagonally across the field, approximately on the contour. The farmer planted it so as to best utilize all rainfall. It was beneficial, but it could have been much better if the farmer had had ac-

cess to the latest research and experiences in contouring, terracing, and cultivation techniques.

Active measures are being taken to combat wind erosion, and attention is also being given to other land-use problems. The Danish Heath Society is continuing its efforts to increase the number of windbreaks, to reclaim heath areas, and so on. Many sand dune areas have been stabilized. Some wet sand and peat areas are ditch-drained and then planted to selected strains of willow for the local basket industry. Certain heath areas are burned, plowed deep through podzol pan which is about 3 inches thick at 1-foot depth, and then planted to alternate rows of pine and spruce. The nurse crop of pine is cut after 16 to 20 years. Some blow-out areas and sand knobs have been planted to conifers.

Sweden is a country rich in forests and poor in agricultural area. And yet pine trees are planted on level land formerly farmed because the soils are too sandy and experience has shown that agricultural production on such soils is uneconomical. Many United States farmers on sandy soils ought to take a lesson here. It may be profitable for Sweden, also, to investigate wind erosion outside the sandy areas. A cutting wind storm of February 27-28, 1947 eroded and carried material from all types of soils and fields—even from land with some protection from surrounding woodlands.

Although wind erosion control is in progress in Scandinavia there is very little attempt being made to control water erosion. A survey of the Swedish literature brings to light a small booklet on soil erosion in southern Sweden by a man interested in improving small fish streams and a publication dealing with river sampling of a small river in central Sweden. River sampling does not measure field erosion. Furthermore, the publication states that there is some evidence that field ditches carry greater amounts of silt than the river. It also says: "This (the plot method of determining erosion) is in itself of very great interest." One weekly farm journal had a recent article on the U. S. Soil Conservation Service and its activities and stated that Sweden, luckily, had no corresponding problem!

It appears that the best way to appraise the problem would be to obtain reliable research data. The experimental plots necessary to determine the extent of soil losses can be constructed rather inexpensively and the practical value of the results

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might well repay the cost of the experiment. Of course, the results cannot be comparable to those available in the United States. They must be weighed according to the percentage of arable land, the population density, the size of farms, the climatic factors, etc. Another point worth looking into is that of the new methods of tillage which have proved to be very useful in controlling erosion.

Denmark, Sweden, and Norway take good care of their forests, improve their strains of cattle and crop plants, drain farmland and waterlogged forest land, and do a host of other things to improve yields and quality, with little regard to high initial cost. They know that these investments can be classified as permanent credits. Equally good or better investments are soil and water conservation practices. Since food is so vital to the world today, redoubled efforts should be made to increase its production. One of the best, and cheapest, ways would be to install the new, tested, and proved water and soil conservation practices.

REVIEWS

THE EARTH IS OURS. By Marion Pedersen Teal. 205 pages. Illustrated. Thomas Y. Crowell Co., New York City. 1948. Price \$2.75.

This title is the sign of final ownership of a farm home and of the possession of the security such provides. The book is another one of the many giving testimony that finally we are coming to see the soil as our security and the need for the conservation of it. It is bringing the folks of the city to think about rural folks as an integral part of our national pattern in which no longer the rural standards can be much different from the urban.

This is the story of the first 6 years in ruraldom of the young couple of university graduates whose college education had converted them to metropolitan life only to have them backslide, after their first born, to the inherited farm in the Corn Belt. Each of 18 chapters moves along with this couple through the many events, some troubles, some trivialities, and some successes, that will be profitable reading to those equally as naive. Though not new, it will be amusing and entertaining to those grown up and always living on the farm. It will be especially good reading for any one transplanting himself to a farm without previous farm experience. To take over the management of a farm, to assume a \$12,000 debt, to stock 230 acres by patronizing farm sales during wartime high prices, to convert a barren house into a home, to fit one's self into the community that was giving the book farmer only 3 years, and then to pay off the debt in 6 years, can

be an interesting story to the reader, as told by the feminine partner of the couple for whom it was a real story.

Mrs. Teal portrayed the elements of the pioneer on the farm today and pictured the realities of rural life. Unanticipated as these were, they loomed large, in the problems and privileges connected with the snowstorms, the summer droughts, the drowning of the young chickens, the farrowing of the pigs, the handling of the hired man, getting acquainted with the neighbors, appreciating the historical elements in the locality, the social and business side of Saturday night in town, the Christmas Eve in the country school, and the interpretation of the community gossip in its proper human flavor—all of which are realities of the first magnitude on first acquaintance. The author makes them such for anyone not rural reared and experienced in farm lore.

The style is good, the descriptive terms are colorful and mechanics of thought delivery very smooth. The reader will move along rapidly to finish all too soon this distinctly human and entertaining portrayal of modern rural life.—
WILLIAM A. ALBRECHT.

NORTHEAST

THAT'S A LOT OF EGGS!—Everett Rogove, Camburton Soil Conservation District, N. J., makes these comments:

"We have operated a poultry farm of 77 acres near Lakewood, N. J. for the past 10 years. We are breeders and hatchers, keeping 7,000 pullets and hens and raise about 5,000 pullets each year.

"On the hilly part of our farm we had bad sheet and gully erosion. Another problem was road water which was dumped on our fields. We were unable to grow grass on these fields, and we could not raise young stock on them. Due to the condition of our land, about 5 years ago we called on the Camburton Soil Conservation District supervisors to help. A farm planner of the Soil Conservation Service visited us and helped make a plan for our farm.

"We built 3 terraces with a total length of about 1,600 feet, and about 600 feet of outlet. We seeded 15 acres of range. The seed mixture consisted of Kentucky bluegrass, orchard grass, Ladino clover, and alfalfa. The present ranges consist predominantly of orchard grass and Ladino clover. These fields were limed and fertilized before seeding. By following the recommendations in the conservation plan, we have been able to grow much better pullets, and healthier ones, than before.

"Before we had established good ranges and were able to use these fields, we usually fed one-half to one-third mash to our pullets. We now feed about 90 percent grain and only about 10 percent of laying or conditioning pellets. The grass furnishes sufficient protein to let us follow these feeding practices. The good range has cut the cost of raising pullets. The cost of maintaining the range is only a fraction of what the additional feed would cost if we were unable to put our birds on these good ranges. I do not have exact figures, but I think the saving amounts to at least \$1,000 a year.

"One thing unusual about the way we farm in this section is that we raise both corn and oats. The past few years we have raised about 14 acres of corn and an equal acreage of oats. We combine the oats and save the straw. This provides all the litter. We follow the build-up litter system. With this acreage of cultivated crops, we are able to haul all of the poultry manure to the crop fields. This eliminates the worry about disease being brought in from manure haulers.

"Our average egg production per bird is excellent. We won the Vineland Flock Mating contest for 1946-47, av-

eraging 232 eggs per bird. Last year we had the highest average of the 13 ROP breeders in New Jersey. The average production for all birds in the flock was 214. The average production per qualified bird was 243 eggs and we had the highest average of all entered birds which qualified, 62.4 percent.

"The practices called for in the conservation plan for our farm have helped us greatly in our poultry business."

PIGMENT PEPS UP.—"I have been in the poultry business for about 19 years," writes Hyman Kassenoff of the Camburton Soil Conservation District, N. J. "I usually keep around 3,500 White Leghorn layers, and have only 5 acres of land.

"My soil is very sandy. We could not keep any grass on the ranges which had been very badly washed.

"A little less than 4 years ago, I requested help from the Camburton Soil Conservation District. An SCS farm planner visited my farm and helped make a plan for the 3 acres used for range. The plan called for 700 feet of terraces to be emptied in a wooded area, which we built in 1945. These were seeded to a mixture of redbud, orchard grass, alsike, Ladino clover, and alfalfa. The field was limed and fertilized, and the grass mixture seeded with oats as a cover crop. This was done in the spring, whereas permanent seedings are usually done in the fall.

"This is the third season that this range has been used. We have raised about 2,000 pullets each year on the 3 acres of range. We have plenty of grass for our pullets and have stopped the washing of soil.

"We have been able to raise much healthier pullets on the grass, and we feel they are better to work with when they go into the laying houses. The pigment coloring in the legs of the birds has been much more pronounced. The cost of raising our pullets has been reduced. I think that the poultrymen in this section could benefit by having conservation plans made for their farms."

NOTE FOR ENGINEERS.—A simple slide rule that permits the design of terraces, diversions, and outlets for drainage areas up to 20 acres, without computations or reference to tables and charts, has greatly facilitated the planning of water disposal systems in the northeast.

The slide rule, developed by Gail W. Eley, SCS zone conservationist, Upper Darby, Pa., has been in successful operation for nearly 2 years. It is inadequate, of course, when more complex water disposal systems must be designed for watersheds larger than 20 acres.

To facilitate the production and use of the slide rule it was necessary to combine several of the controlling factors, which include size, shape, and slope of watershed, soil type, land use, and rainfall pattern. Because of the variation in rainfall it was decided to produce two rules—one for the northern part of the region and one for the southern States.

The cardboard rule is 3 inches wide and 6 inches long. Its two outside covers are taped together along the six-inch sides, and open at each end. The printed figures are on a separate piece of cardboard that slides up and down inside the taped covers.

At one end of the "front" side of the cover are windows for trapezoidal outlet design with openings for slope, depth in inches, bottom width in feet, and "Q" in cubic feet per second. At the other end on the same side are windows for diversion ditch design, with openings for grade, depth in feet, width in feet, and "Q" in cubic feet per second. Under each window is a sketch illustrating the type of design.

On the "back" side are windows for parabolic outlet design, with openings for slope, depth in inches, top width in feet, and "Q" in cubic feet per second. The type of design is also illustrated by sketch. The same side of the cover contains runoff curves, including the names of the States where the rule is to be used. Horizontally, the curves follow acres, from 0 to 20. Perpendicularly, the

"Q" in C. F. S. is shown, from 0 to 50. There are two curves, one for pasture and woods and the other for cultivated land.

Here is how the rule is used: The expected "Q" or quantity of water to be handled by the structure is obtained from the runoff curves. That is done by selecting the size of the drainage area from the bottom line, following the line up to the correct curve, and then reading the "Q" on the left side of the chart. After the proper "Q" has been obtained the size of the diversion or outlet—trapezoidal or parabolic section—can be selected from the appropriate part of the rule. To do this, you first determine the grade on which the channel of the structure will be built. This is shown in the left-hand window. Then select the quantity of water to be handled from the right-hand window. The figure directly above this quantity will be the width of the structure, and the depth will be shown in the middle window.

—WALTER S. ATKINSON.

TENANT WON OVER.—"When my present tenant took over my farm (150 acres, 100 tillable) production records were practically nil," writes R. J. Guastavino, of the Kent (Md.) Soil Conservation District. "Cultivated land approximated 20 acres with practically no livestock being carried on the farm.

"With the adoption of a farm plan the poorer areas were set aside for hay and permanent pasture and poorly drained areas were made fit for cultivation by the installation of a drainage system.

"My tenant was very reluctant to adopt and follow the plan. However, as the program was established and results became visible his attitude changed.

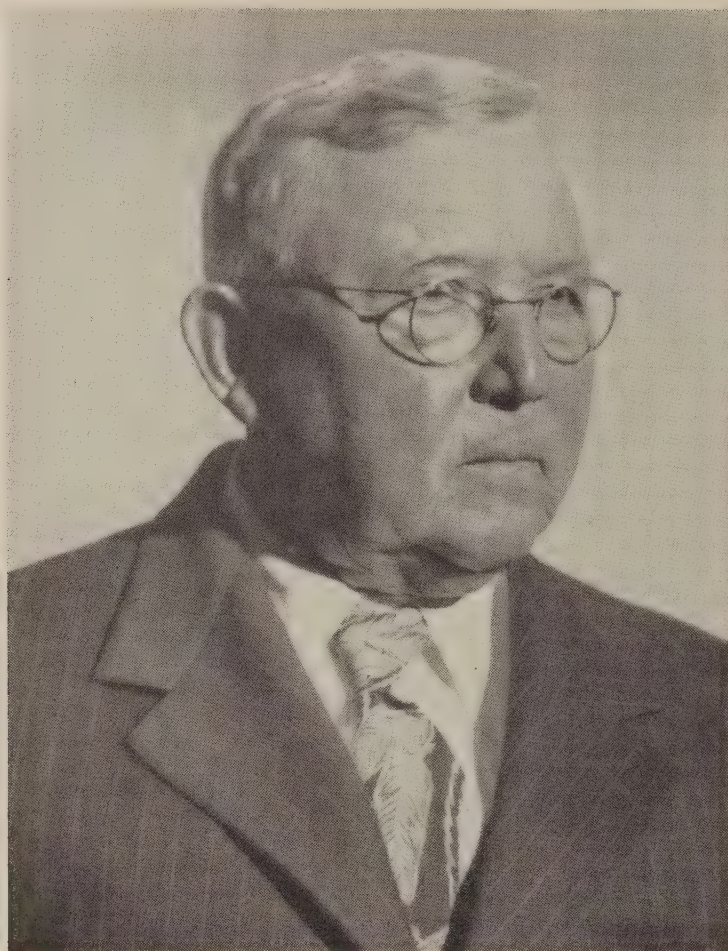
"At the present time we have 80 acres in tillage with another 20 acres to be brought into production some time in the future. Our corn and wheat yield has doubled, our livestock earning capacity has increased due to our increased production of feed, hay, and pasture. A full utilization of the Government lime allowance has enabled us to establish legumes and grasses in areas formerly too sour for production.

"Through better land use we have followed a balanced rotation including tomatoes as a cash crop, distributed our work load, and reduced production costs, thus increasing the profit per acre."

SOUTHEAST



LAND USE EXPLAINED.—In assisting Hobert Sims, of the White County (Tenn.) Soil Conservation District, to develop a plan for his farm, the Soil Conservation Service technician referred to the soils map and commented that a certain field was not suited for alfalfa. Sims was surprised at this remark and asked why. The technician explained this was due to hardpan soil. Sims then related his experience in trying to grow alfalfa on this land, and said he thought it had failed because of the seed used. After that, he had full confidence in the technician and saw the value of his soils map.



T. B. Thornton

STREAMS HELD IN CHECK.—When the Augusta Chamber of Commerce was host at a Savannah River watershed flood control meeting this spring, T. B. Thornton of Hartwell, Ga., gave specific examples of the way soil and water conservation work is reducing flood damage.

Thornton is president of the Savannah River Soil Conservation Districts Association, as well as chairman of the supervisors of Broad River Soil Conservation District of Georgia.

"Broad River Soil Conservation District has been in operation 10 years," said Thornton at the meeting where details of the Department of Agriculture's survey of the Savannah watershed were explained by the Soil Conservation Service. "In this short period we have slowed down our surplus water so we have very little erosion.

"This has been brought about by contour planting, close-growing crops, and other practices. In this way we retard our surplus water so we do not have excessive erosion. Our streams do not overflow as they did many years ago.

"It is common knowledge that our streams do not reach the high-water marks that they did before the coming of soil conservation.

"I was reared on a creek that overflowed so badly we had to abandon cultivation on much of our best land. The creek is still serving the same watershed but we seldom have freshets that destroy our lowlands. Much of this land is now in cultivation in crops or pasture.

"I call to mind a mark I made on a large tree many years ago, but have not seen this creek within 6 feet of this mark since we started soil conservation practices fitted to the land.

"The run off water in our streams does not carry so much silt as it did before we had soil conservation practices. Our lowlands are much more valuable than they were 10 years ago."

KNOW YOUR SOIL.—Some 90 soil types are found in Lord Fairfax (Va.) Soil Conservation District. They are derived from several rock formations in five areas roughly designated shale, limestone, sandstone, crystalline rock, and sandstone-and-shale. The district is featuring these areas in posters and other printed materials and urging "Apply today for a land capability map giving a complete inventory of the soils of your farm, and for assistance in the planning and application of soil and water conservation measures fitting the land and the farm economy. Use and conserve soil and rainfall. This will mean greener fields, clearer streams, and lasting security."



BY OXTEAM AND AMBULANCE.—F. C. Ewen, district conservationist at Morehead, Ky., was accorded a hearty greeting recently when he visited the Big Run Coal & Clay Co., Princeton, Ky. As an employee of the Soil Conservation Service, he was precisely the man the company had been waiting to see. Curiosity was at high pitch as a result of a white-hot demand for farm drainage tile. Six months earlier this company had manufactured a full million feet of such tile—and here it had only a skimpy 6,000 feet left! Every foot of the supply had been sold to cooperators of soil-conservation districts. Counties without districts showed little interest in the product. "What are these districts, anyway? And how do they operate?"

Ewen made this report: "Tile had been hauled away from the plant in carloads, by truck, by wagon, by oxen, by buggy, and by sacks. But the district cooperator who capped all modes of transportation was the one who brought a sick person to the Ashland Hospital and came back by the tile plant, covered the inside of his ambulance with corrugated paper, and hauled away 150 joints to finish up the tile system on his farm!"

NORTHERN GREAT PLAINS

WELCOME WATER.—"Spring run-off from the hills is my insurance against livestock feed shortages in winter," reports Joe Eggen, a cooperator with the Reserve Soil Conservation District in northeastern Montana.

Eggen's lay-out is along the broad Muddy Creek valley, said to be a preglacial channel of the Missouri, which is bordered by an expanse of rough upland that is largely range. Spring runoff from melting snow sends large amounts of water into the valley. Part of the Eggen farm is in the valley bottom, and part is upland range.

"We've got 65 acres under flood irrigation now, laid out by SCS technicians," Eggen said. "We have about 50 more acres to go. And believe me, it pays.

"For example, I had the first flood-irrigated field of wheat in 1946. It yielded 30 bushels per acre, compared with 15 to 20 bushels on dry land. Now that field produces just as well in alfalfa for hay. Last fall I had 14 big stacks of hay that came from that land.

"I was brought up on this farm, and during my life there has been hardly a year when there wasn't enough

water to give the bottomland a good soaking. The only 2 years that I can remember when there wasn't enough runoff were 1934 and 1935. But even then, the stockwater dams filled, so there was enough water for livestock.

"And with that nearly a sure feed source, I can carry the number of livestock the range will support without being afraid of feed shortages."

SHELTERBELT BOOSTS YIELD.—A dryland field, protected by a shelterbelt, produced the highest yield, 106 bushels per acre, in the Stanton County, Nebr., corn-growing contest conducted by the Extension Service. The winner was Ernest Fuhrman of the Stanton Soil Conservation District.

The contest plot was 10 acres in a 90-acre field that is protected by trees. It was given no different treatment from the rest of the field. The whole field, however, has been contour farmed since 1942 with a rotation that included sweetclover, as part of the conservation plan the Soil Conservation Service technicians helped him develop.

Oats with sweetclover had been grown on the field in 1946, and last spring 10 tons of manure per acre were put on the land. A drouth in July and August lowered corn yields generally, but this field held up well.

"The shelterbelt made a lot of difference last year," Fuhrman said. "My best corn was near the trees. The farther you got out into the field from the shelterbelt, the less the yield."

"THE RAIN BELONGS TO ME."—Conservation farming has done much to solve his problem of too little water on most of his farm and too much on a small part of it, according to Joe S. Kampa, cooperating with the Day County Soil Conservation District, S. Dak. He began work on his conservation plan 2 years ago.

Now, he reports, he keeps much more rainfall where it falls on his 270 acres of sloping cropland by contour farming and terracing. And 21 acres, where water once accumulated in low places, has been drained. In both instances yields have been hiked as a result of conservation. Another important benefit lies in the control of erosion. Before conservation, his fields were washing badly and some gullies were too big to be crossed by farm machinery.

"I never did believe that an average of 20 inches of rainfall in one year was too much for a crop," Kampa said, "and I hated to drain any water off my land to some place where it couldn't be used."

"So, instead of draining water from these low places into a waterway and allowing it to run off the farm, we ran the water into a terrace and back around the hillside where it belonged, making sort of an irrigation system. That little stunt, along with the contouring, certainly helped yields on that land."

"Last spring during all those heavy rains there was just a little water that ran down the waterway and off my farm. The rest stayed on the hillsides where it belongs. The rain that falls on my farm belongs to me and, by golly, I'm going to try to keep it."

GRASS.—Grass pays farmers two ways, with income from the grass and with higher grain yields following grass, says Enoch Anderson, a cooperator with the North Burleigh Soil Conservation District in North Dakota.

"Net returns per acre from grass seed," Anderson explains, "are about the same as from other crops. But the grain crops following grass are up more than 10 percent, and the soil is in better condition to resist erosion."

Anderson's grass program is part of the farm conservation plan that Soil Conservation Service technicians

have helped him apply. He began cooperating first with a CCC camp and then with the soil conservation district after it was organized in 1941.

"During the last 12 years," Anderson said, "I've seeded more than 400 of my 700 acres of cropland to tame grass as part of the crop rotation. Cropland is left in grass from 4 to 8 years, and each fall I seed an acreage equal to or a little more than what I broke out in the spring."

The tame grass also helps out in the pasture program. He uses the tame grasses in early spring and late fall, pasturing the native grasses in summer and early fall. This, he said, lengthens the grazing season 4 to 6 weeks, and in addition makes it possible for him to defer grazing the native grasses in spring.

ONCE WORTHLESS.—Harvesting a wheat yield of 25 bushels per acre from land that had been virtually abandoned in 1944 was the experience last year of John E. Olson, cooperating with the Atchison County Soil Conservation District in Kansas. Conservation farming had saved the land.

"The field was so badly gullied that it was almost impossible to farm it any more," Olson remarked. Soil Conservation Service technicians helped him work out a plan to conserve the whole farm. Terrace construction on the most severely eroded land was begun immediately.

Contour farming came next, and the field was seeded to small grain and red clover to start a grain-legume rotation. The increased production resulted.

WESTERN GULF

SMART SLOGAN.—*The Clay County Democrat*, published weekly at Rector, Ark., has begun printing a slogan reading "SAVE THE SOIL—IT WILL SAVE YOU" on its front page. The words appear immediately underneath the bold type that proclaims the paper's name. Editor H. C. Anderson says the local Clay County Soil Conservation District has "sold" him.

HOW TO AVOID IDLE LAND.—L. W. Rosenbaum, a cooperator with the Hansford County Wind Erosion District, near Spearman, Tex., uses crested wheatgrass and western wheatgrass along the edges of his fields on land not suited for cultivation. Crested wheatgrass proves the better of the two because it is the more palatable over the entire grazing season. Both grasses, however, are excellent for controlling erosion and making productive use of land that otherwise would be idle or subject to severe erosion, if cropped.

When the grazing season has ended, a grass seed crop may be harvested from these areas, a practice which also fits in well with the harvest of Rosenbaum's wheat.

These isolated areas are common in the Rolling Plains of Texas and Oklahoma and even on the High Plains, especially near the caprock, around lakes and in other localities of broken topography. Though usually small, such areas need not be wasted if treated and managed in a way to fit the rest of the conservation plan.

The kind of grass to seed on such areas depends upon the crops to be grown on the part of the field remaining in cultivation, and the use to be made of them. Other factors to consider are the climate and the soil, the equipment available for establishing grass, and the livestock that will use the grass.

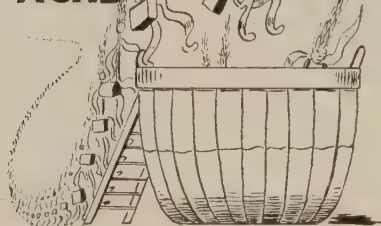
If the field is planted to crops that will be grazed seasonally, the areas should be seeded to something that will afford grazing at the same time as the field crop. If the soil is shallow or stony, a grass that will do well on such soil should be planted. A specialized kind of grass should be avoided unless equipment for seeding and harvesting it is at hand. If the livestock are best suited to, and are in need of, winter grazing, cool season grasses are advisable.

in the Hansford County Wind Erosion District, co-operators are being assisted by Soil Conservation Service technicians in making practical use of field corners and edges by planting them to one of the winter-growing perennial grasses for grazing with the grain pastures. In this way they are not only protecting their land but keeping it in maximum production.—HERSHEL M. BELL.

KEEP THE LID ON.—"The land that is seeded to cover crops, such as vetch, oats, or winter peas, remains just as whole and fertile at the end of winter as it was in the fall," observes Fred McCollum, editor of the Forrest City (Ark.) Times Herald. McCollum is one of the most ardent and effective supporters of soil conservation in his State.

"Productivity per acre, rather than total acres in production, has long been recognized as a proper yardstick for all farm profit, and the man who plants winter cover crops, especially legumes, always shows up well in production per acre."

**83 BUSHELS
PER
ACRE**



ARKANSAS TRAVELER PAYS OFF.—M. H. Bredehoeft, cooperator with the Arkansas-Verdigris Soil Conservation District, living on an upland farm one mile south of Broken Arrow, Okla., raised 83 bushels of Arkansas Traveler oats per acre last season, notwithstanding the fact that 40 per cent of the oats were winter killed.

Bredehoeft started using lime with a legume in his crop rotation when he first developed a farm plan with the Soil Conservation Service, cooperating with the Broken Arrow CCC Camp, in 1936 and 1937.

He was one of the directors of the board of the Broken Arrow Soil Conservation Association, organized in 1936 to purchase rock phosphate in carload lots and some phosphate-spreading equipment. That early association introduced rock phosphate to Oklahoma for use in the soil-building program with legumes in the crop rotation. The organization discontinued operation in 1942 when the local Arkansas-Verdigris Soil Conservation District began full-scale operations.

The conservation practices recommended in Bredehoeft's conservation plan included the use of 2 tons of lime and 500 pounds of rock phosphate per acre, together with barnyard manure and a legume in rotation.

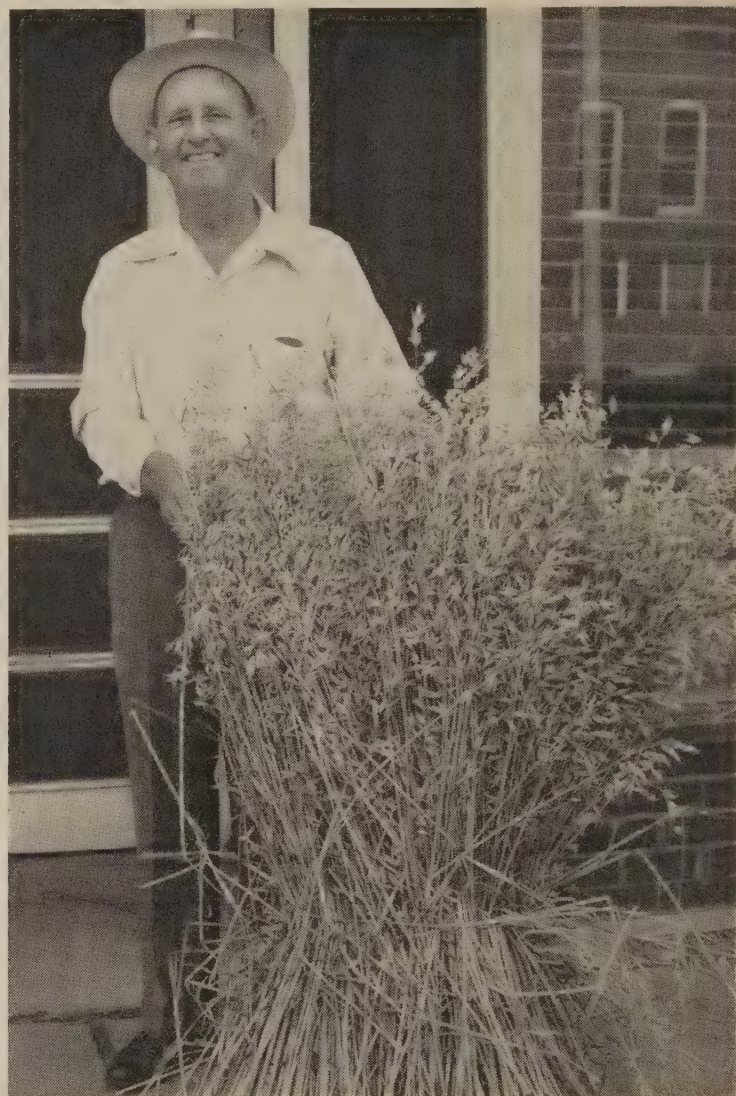
The legumes included cowpeas, mung beans and Korean lespedeza. These were seeded with small grain over a period of years.

After harvest in the summer of 1947 the farm showed a good growth of Korean lespedeza in the oat stubble along with quite a lot of Bermuda grass. This furnished summer and fall pasture for Bredehoeft's Hereford cattle. The Bermuda grass had no damaging effect on the yield of oats.

In August 1947 Bredehoeft harvested more than a ton of Korean lespedeza hay from the field where he raised the oats, and in October he prepared the land and seeded Traveler winter oats.

Summing up the 1947 yields, Bredehoeft got 83 bushels of oats per acre worth \$1 per bushel and the lespedeza hay

worth \$18 per ton. That gave over \$100 per acre gross income from this land and still doesn't account for the grazing which the field furnished.—J. A. Killough



M. H. Bredehoeft

SOUTHWEST

SCIENCE COMES TO THE RANGE.—Where dust storms once raged in the Grantsville-Tooele area in Utah, stock now grazes to provide living proof of the value of scientific range management.

Just a dozen years ago this was known as a dust area. It was not only useless for grazing or other purposes but also made living nearly unbearable in adjacent communities. The tract, able to support only 250 sheep, 4 months a year, stood as mute testimony to the evils of poor management. Today the same area supports 26 times that number of sheep. By the end of the year, horses, cattle and sheep will grow fat and bring smiles to the faces of owners.

This was all brought to pass after the Grantsville Soil Conservation District formed to combat the dust problem. The Soil Conservation Service provided technical assistance in grazing management, fencing and water development.

On-the-spot surveys by technicians determine available feed and when the area may be grazed. They also assist in estimating such supplementary measures as fences, water development and salting areas. Grasses for reseeding are selected for controlling wind and water erosion because of their large root systems, as well as

for their value and palatability for stock. Crested wheatgrass is primarily an early spring and fall grass, while fall wheatgrass promises to be a late spring and early summer feed.

Now the area is more than "holding its own." It also is useful as a means of building up other denuded ranges. While these are being revegetated, excess stock grazes in the former dust area. Thus, it plays a vital role in getting conservation established elsewhere.

Ray Hammond, Grantsville, secretary and treasurer of the district, was responsible for organization of the Grantsville district and has been a key man since its start. Other members of the board of supervisors managing the project are A. L. Hanks, Tooele, chairman; Hampton Worthington, Grantsville; Howard J. Clegg, Tooele, and Allen Warr, Erda.

ONE DAY vs. FIVE YEARS.—The most spectacular soil and water conservation demonstration in the history of the Southwest is scheduled to be held Labor Day, September 6, in the Canadian River Soil Conservation District, Quay County, N. Mex. It will involve the complete remaking of a 40-acre irrigated farm in a single day, says Morris Lewalling, secretary-treasurer of the district. The program calls for leveling, ditching, fertilizing, seeding, and the installation of irrigation structures.

The purpose of the demonstration, first of the kind in this part of the country, is to whet public interest in soil and water conservation. This work normally would require five years or more.

District supervisors have selected the farm of J. C. White, a 24-years-old veteran. White, who is married and has three children, started a dairy farm near Nara Visa soon after being discharged from the army. When his rented farmhouse burned, he was forced to sell his herd, and has used these funds to purchase the 40-acre irrigated farm. Most of the "remade" farm will be used as irrigated pasture for a new dairy herd.

Lewalling says that Labor Day has been selected so that business people can attend. This date comes before farmers get busy with the fall harvest, and it is a good time to plant pastures. Many persons from irrigated areas in New Mexico and Texas are expected to attend.

BRINGING IN THE WATER.—Seven years of effort by Phil Maestas, manager of the Santa Cruz Irrigation Co., finally developed plans for combining the main headings from the Santa Cruz River of the Mesilla, Ortigas, and Garcias ditches. This project is being pushed in cooperation with the Pojoaque Soil Conservation District, Santa Fe, N. Mex.

The three old ditches ran parallel for 1½ miles and served 195 farms including 1,400 acres of irrigated land. The work plan for the consolidation calls for a new heading, installation of sand-sluicing structures, and construction of a new 6,200 foot ditch. The productive farm of Frank Williams, a cooperator of the Pojoaque Soil Conservation District, has been cut by the three old ditches, but under the new plan only one ditch will be located on his land.

Excavations will be made without cost to landowners since the dirt from the new ditch will be sold for fills in Espanola and Riverside.

P. A. Campredon, Soil Conservation Service engineer, estimates that the improvement will reduce irrigation water losses by 25 percent, and that maintenance of the combined heading will be cut by half.

COTTON COSTS CUT.—Producing 1.5 bales of cotton on 2.5 acre-feet of water, bringing his average lint production up from 250 pounds per acre to 700 pounds within 3 years, and cutting \$4 per acre off his chopping costs, is the record set by John Bowling, a supervisor of the Florence-Coolidge Soil Conservation District in Arizona.

Bowling first attained this yield in 1944 on 600 acres, some of which had previously been regarded as practically worthless. "The credit goes to deep plowing," he says, "and to the deep water penetration which results from deep tillage." After he gets the water down 5 or 6 feet, he doesn't need to irrigate again for about 120 days, except for light irrigation when the seed goes in.

Two things are going to be of prime importance to his farm in the years ahead, he believes: (1) soil and water conservation, and (2) more efficient, cheaper methods of production.

One important measure he uses to cut production costs is mechanical chopping. In 1944 he built a tool bar for working across the cotton rows. He mounts several 16-inch sweeps placed 25 inches apart at the bar. That leaves a 9-inch space between each sweep. Of course, it isn't selective about chopping, but it leaves 3 to 4 plants in each clump and cuts the cost of chopping from \$4.50 to \$5 an acre down to \$1 to \$1.50.

SIMULATED RAIN.—Irrigation by sprinkling, a method largely new in this area, has been started by Carl Judson on his farm 3 miles south of Wellington, Colo. Working with the Fort Collins Soil Conservation District, Judson has installed 1,600 feet of irrigation pipe for watering about 40 acres of irrigated pasture. The system is supplied from a well.

Judson's farm includes 220 acres, one-third of which he intends eventually to devote to grass. Part of the area will be used for growing seed of grasses adapted to special soil uses.

CANYON RESERVOIR.—A lifelong ambition of Henry Brown, one of the first cooperators of the Northeastern Soil Conservation District, Union County, N. Mex., is about to be realized through the use of district equipment and SCS techniques.

For more than 50 years Brown has had to depend upon flood flows to water the hay meadows on his ranch in the Long Canyon country. During dry years, when irrigation water was most needed, runoff was fast and flood flows subsided quickly, making proper irrigation impossible.

Brown has believed for years that if he could store a portion of the flood water to be used later, and if he could irrigate with a smaller head of water, that he could bring his hay meadows into highest production.

Finally, he worked out a cooperative agreement with the district under which a storage reservoir will be installed in a branch of the canyon. This will make possible one good irrigation of his hay meadows, in addition to the use of flood waters.

MAKING WATER BEHAVE.—The establishment of permanent soil and water conservation practices on 15 irrigation ditch systems, including 504 farms in the Pojoaque Soil Conservation District, in northern New Mexico, has been a recent outstanding accomplishment, according to W. A. Williams, Jr., chairman of the district board of supervisors.

Major improvements on the ditch systems along the Tesuque, Nambe, and Pojoaque creeks include the installation of two infiltration pipelines, one cement diversion dam, flumes along river banks and across arroyos, syphons underneath arroyos, straightening ditches and giving them a uniform width and slope, construction of brush jetties with diversion gates, drop turnouts and checks on the main ditches.

The total cost of this work was \$12,000, which was paid by the various ditch systems, with the Soil Conservation Service furnishing technical assistance. Landowners along the ditches feel that these soil and water conservation improvements will repay the full cost of the projects within a few years through savings of water and maintenance costs alone.

SMOOTH FARMING.—Land leveling is the best investment that can be made on an irrigated farm, according to S. E. Sparks, chairman of the DeBaca County Soil Conservation District in New Mexico. Sparks bases his opinion on the fact that land which has been leveled on his farm now is producing almost double, water is being conserved, and time and labor in irrigating has been reduced greatly.

Sparks relates his experience in leveling 13 acres last year. "Before it was leveled one 7-acre field had to be watered by means of a ditch on three sides," he says. "This was very unsatisfactory because the water ran off the high spots and collected to a depth of 4 inches in a low area. This causes alfalfa on the high ground to dry out, while that in the low areas was flooded. Since this field was leveled properly, I can irrigate perfectly from one ditch, without borders, and my alfalfa production has been practically doubled.

"The other 6 acres had a high corner and several low spots where the alfalfa was continually being drowned out. Since that tract was leveled it irrigates fairly satisfactorily, but needs a little finishing to make it perfect."

Sparks recalls his experience with 3 acres in two fields that had to be irrigated from two ditches. "I worked with this problem for 2 years and didn't make enough to pay for my labor. I leveled the 3 acres about 3 years ago at a cost of \$50 per acre. I put this field in alfalfa 2 years ago. Last year the 3 acres were grazed for a month in the spring. I cut the alfalfa only three times in the fall, but this paid me \$125 per acre whereas, before leveling, I wasn't even paid for my labor.

"I now can irrigate all my land in half the time, with half the labor and probably not more than half the amount of water that was required before leveling," Sparks says.

OVERNIGHT PONDS.—Overnight storage ponds are fast becoming a "must" with farmers in the pump-well areas of the Iron County Soil Conservation District in southwestern Utah.

During irrigation periods most pumps operate constantly with the water going into ponds which average about 200 feet square and 5 to 6 feet deep.

Farmers who have such ponds usually stop irrigating around 9 o'clock at night and can resume around 6 o'clock in the morning with their pond full of water.

Chester Whitelaw, a GI farmer who follows this method, says he now can irrigate with larger heads, that the water covers his land more efficiently, and that he can see where the water is going. He also likes the idea of being able to get a good night's rest and not having to get up at all hours to attend to the flow of water.

Another district cooperator, Harvey Adams of Parowan, says: "My overnight storage reservoir has increased my crop yields by at least 25 percent. I never will attempt to farm without a storage pond."

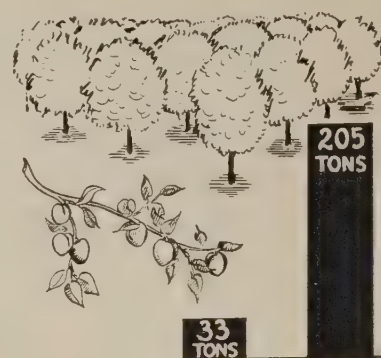
Another "must" with the farmers of this area is the practice of lining their ponds with bentonite because of the sandy nature of the soil. A. L. Graff, a district cooperator, reports that he never was assured of a pond full of water until he lined his reservoir. Now he has to keep watch on the water to prevent it from topping the banks.

RESULTS FROM LEVELING.—Value of land increased \$50 per acre, crop yields increased 25 percent. Irrigation became possible in half the time and with half the water.

These results were accomplished by land-leveling on a 17-acre field on the Elwood Dalton farm in the Piute County Soil Conservation District in Utah.

Dalton did the job on his land with a tractor and home-made scraper. It cost him 10 cents a yard to move the dirt, or \$17.50 per acre.

PACIFIC



HE LEARNED ABOUT HIS SOILS.—R. C. Goodman, owner of the Dry-Cot Ranch in the Douglas Soil Conservation District in north-central Washington, gathered only 33 tons of fruit per acre from his 34-acre orchard in 1943. It takes water to get good crop yields in the Wenatchee Valley.

The 33-ton output fell far short of the mark Goodman had set as the pay-off from his investment. He began severe pruning. He poured on fertilizer. Next harvest season his apricot crop shot up to 85 tons per acre.

Riding the crest of a bumper yield, Goodman started the 1945 crop year expecting another high yield. His hopes faded when the yield dropped to 60 tons per acre. Production skidded again the following season, with an output of 47 tons.

In an effort to store up moisture, Goodman plowed under his cover crop and began to practice clean cultivation. Soon "dusters" came and his unprotected soils began blowing away.

Stumped with the problem of serious soil loss, he told his troubles to the governing body of the Douglas Soil Conservation District, which asked the Soil Conservation Service to give technical help to the orchardist.

As the first step, Service technicians recommended that sprinkler-type irrigation be installed.

Goodman next dug a well on the flat below his farm, close to the Columbia River and installed a pumping system. Soon he had plenty of water. But there were still many things he didn't know about his soils and their capabilities.

"Service technicians made a soil survey of my place which showed the good and bad features of my soils," says Goodman. The soil samples were sent to the cooperative soils laboratory at Pullman to find out their water-holding capacities. They calculated the amount of irrigation water and how often it should be applied. They helped me plan a cover-crop program, a sort of vegetative blanket to cover my orchard and prevent erosion. The cover crop also put needed organic materials back in the soil. Fertilization helped speed growth of my cover crop."

Goodman has preserved the quality and flavor of dry-land "cots" by irrigating only once on the deep soil and twice on the shallower soils in the spring before harvest. From the 35-ton mark of 1943, his apricot trees produced a 205-ton crop last season. His first cover crop effectively stopped erosion from "dusters."

Figuring expenses against last year's profits, Goodman estimates he paid half the cost of his sprinkler system from one crop of apricots. In fact, the system worked so well, that he plans to use the water to expand his orchard, putting back into production idle, nonproducing and dried-out portions of his lands.

THE URGE TO CONSERVE.—It's not enough to farm the conservation way. You have to *want* to do it, in the opinion of Paul C. McGrew, Washington State conservationist of the Soil Conservation Service.

McGrew recounts an incident which occurred on a farm tour of the Palouse (Wash.), grainland erosion area a year ago. The tour was timed to follow a period of heavy soil erosion damage.

Touring farmers noted there was no erosion on the Bill Redmond ranch, clearly indicating the gains from using soil-saving practices. During the discussion of the practices applied by Redmond to his sloping fields, a farmer inquired, "Bill, some of us put soil conservation work on our lands, too, but we haven't had the success you've had. What's the answer?"

Redmond, a man of few words, replied, "Well, first you have to want to do them."

Redmond came to the Palouse country more than half a century ago. He has never burned his grain stubble. He makes a practice of plowing so as to turn the furrow uphill. He doesn't cover stubble on steep slopes. He considers the stubble sticking out between the furrow slices an effective way of stopping soil losses.

He has not only taken good care of his lands, but has made money doing it. The records indicate that Redmond's wheat yield was the highest in the community.

"BARGAIN RATE" DRAINAGE.—A community drainage project, completed last fall at a cost of \$3,900, is expected to bring a \$35,000 yearly gain in crops, pasture, and dairy products to 16 farmers in the Davis Lake settlement, near Morton, Wash.

For more than 20 years, the farm group has patched their raggedy-Ann, old-style drainage ditches to cope with heavy rainfalls and frequent overflows from Davis Lake in the heart of their rich, peat bottomland. After each highwater stage, the farmers' mopping-up operations offered only a piecemeal answer to the problem. Each year three-fourths of the 670 acres of water-logged, tussock-covered farmland was left untillable and unproductive.

With dairying and farming limited to the upland portions of their saucer-shaped acreage, the farmers' outlook for the 1948 cropping season appeared darker than usual. At that time Davis Lake spilled out over some 480 acres.

Through the Lewis County Soil Conservation District, the Davis Lake drainage district obtained the help of farm drainage specialists of the Soil Conservation Service at Chehalis. These technicians surveyed the bogged-down acreage with drainage-district members.

They pointed out the "bottle-necks" in the drainage system and the structural changes required to put the ditches and main channel in working order. Most of the ditches were clogged with silt and debris. Surveys showed the watertable had risen an average of 1 inch per year, or approximately 2 feet up to 1945.

Davis Lake farmers completed the recommended changes in the drainage system last summer. Improvements included lowering the water level, widening, deepening and straightening of the main outlet channel.

Almost as soon as the main channel was completed, landowners in the community began cleaning out the network of farm drains. These ditches, crisscrossing the 16 adjoining farms, carry surface water to the drainage channel.

Tillage operations can now begin earlier each spring. All 670 acres of the once-spongy land will be back in production. The dry land will be used for specialty truck crops and seed-selected pasture grasses and legumes.

An example of the gains anticipated by individual farmers is dairyman Mike Sturza's prediction that use of his entire 32 acres will enable him to increase the carrying capacity of his dairy herd from 14 to 20 cows. Most farmers in the area were expected to double their hay output now that their lands can be worked.

In "dollars and cents," Sturza estimates that the drainage improvement program will mean about a \$35,000 gain, across-the-board, for the Davis Lake farm group. Landowners will prosper in proportion to the amount of land drained and the type of crops grown.

As a community enterprise, the farmers received bargain rates on engineering and technical phases.

"The drainage job would have cost us \$16,000, or more, instead of \$3,900 if we tried to do the work without the trained help of Service drainage experts," Sturza says.

Today, farmers in several neighboring communities in the Morton region are eyeing the Davis Lake Drainage work. Some are already planning similar group drainage programs as prerequisite to full-scale use of their lands.

REPORT FROM SEVEN DISTRICTS.—Farming throughout the Yakima Valley in central Washington has had a "rags to riches" growth. Since '72, when the first irrigation channel was dug, linking the Yakima River with the town of Yakima, farming has mushroomed. Bringing water to the farmers' moisture-thirsty croplands was the primary purpose of soil- and water-saving on farms from Ellensburg to Kennewick.

Seven soil conservation districts are now operating in Yakima and Benton Counties. They have set their goal at putting conservation work on more than 1,750,000 acres of farm and range land. The districts include Wenas, Hi Land, Ahtanum, Roza, East Benton, West Benton and Lower Yakima Valley.

Some of the practices being applied include crop rotations, fertilizing, permanent cover crops on orchard lands, improved pasture seedings, efficient management of pastures, drainage, land leveling, control of noxious weeds, and improvement of "low yield" irrigation systems.

Gains from the "farmer action" programs are many. Here are a few examples:

In the Wenas SCD, in 1946, Soil Conservation Service engineers and technicians assisted farmer-members in designing sprinkler irrigation systems for 44 farms, averaging from 4 to 160 acres per system. Around 96,400 linear feet of pipe line were used in installation. The work benefited 1,179 acres.

District cooperators of the Roza district leveled 1,135 acres as the first step to improving irrigation systems. Some 970 acres of approved rotations were established and 875 acres of cover crops seeded for green manure.

Ahtanum district farmers laid a total of 18,000 linear feet of new and rehabilitated drains which directly benefited 532 acres.

Supervisors of both the East Benton and Ahtanum districts have purchased portable, 100-gallon, weed spray rigs for rental to cooperators. East Benton district also owns a 10-foot combination grain and fertilizer drill.

The Wenas governing body reports the district is maintaining 100 miles of fire trails over 78,000 acres of range land, as part of their district fire control program.

Hi Land district supervisors obtained advance rentals totalling nearly \$6,000 from orchardist-members to buy a brush-shredder. Rentals from several cooperators range from \$50 to \$100.

RESEARCH POINTERS

Prepared by J. H. Stallings

DESIGNING FARM PONDS.—The secret of successful farm pond designing is to provide for adequate water to fill the pond and guard against excessive silting, according to L. L. Harold, SCS research, Coshocton, Ohio. To provide for adequate water supply, allow sufficient drainage area to furnish ample quantities of runoff water in the pond during critical drought periods. Excessive silting can be avoided by keeping the drainage area down to the absolute requirements of the storage capacity of the pond and by keeping at least 50 percent of the drainage area in permanent vegetal cover, such as grass or woods.

TIME AND FUEL REQUIREMENTS.—Farming on the contour requires less time and fuel than farming up and down hill, states E. L. Barger, SCS research, Manhattan, Kans. Where up-and-down-hill travel was in one gear lower than down and contour travel, there was a time saving of 20.4 percent and a fuel saving of 11.7 percent in favor of the contour farming. Where the up-and-down and contour travel was in the same gear, there was a time saving of 1.8 percent and a fuel saving of 6.4 percent in favor of the contour farming.

FARM PONDS AND FISH DEVELOPMENT.—Failure in fish development in farm ponds in the Midwest is due primarily to improper adjustment of the size of the farm pond to the adjacent watershed, excessive weed growth, and lack of care in stocking, is the belief of W. L. Anderson,

SCS, Milwaukee, Wis. Proper adjustment of the size of the pond to that of the watershed supplying water for it is essential for most efficient water supply. Controlling weeds in the pond and proper stocking with fish are other essential requirements for successful pond management.

MORE DIGESTIBLE NUTRIENTS.—Conservation farming increased crop yields from 9 to 21 percent, according to E. L. Sauer, SCS research, Urbana, Ill. Both higher yields and larger acreages of better pastures caused the high conservation farms to produce more total digestible nutrients. This resulted in higher livestock production on the farms with well developed conservation programs. Farms with no such programs, or poorly developed ones, were compared with similar farms with well developed conservation programs in six major agricultural areas in the State.

MAGAZINE IS "TYPE OF HELP WE NEED"

FIFTEEN farmers in Lincoln County received 1-year subscriptions to Soil Conservation in May, as gifts from the First National Bank of Lincolnton, N. C.

These men were beginning the application of a complete farm soil and water conservation program in cooperation with the Lower Catawba Soil Conservation District.

Since that time, the First National Bank of Lincolnton has sent a year's subscription to the Soil Conservation Service's official publication to each other Lincoln County farmer who has made a conservation plan with the district's help.

G. Harold Myrick, executive vice president of the bank, is writing each new district cooperator a letter of congratulation for "starting a program which will make your farm a better place to live and will strengthen your community, your State, and the Nation."

"The First National Bank of Lincolnton also wants to assist you in getting all the planned conservation measures on your farm," Myrick continued in his letters to the first group of 15 farmers receiving the magazine. "We are arranging for a 1-year subscription of SOIL CONSERVATION MAGAZINE to be sent to you with the compliments of our bank. We believe that this magazine, the official publication of the Soil Conservation

Service which helped you make your conservation plan, will give you much valuable information and will encourage you in your new undertaking."

The plan was worked out by Myrick and District Supervisor Dave Killian.

"The First National Bank recognizes a complete soil and water conservation program as good business for us and for everyone else," Myrick said.

"We supervisors of the district greatly appreciate this assistance from the First National Bank of Lincolnton," said Killian. "It is exactly the type of help we need to get more soil conservation on the land faster. More and more our business and professional people are recognizing how great an interest they have in our land."

First farmers to receive gift subscriptions to SOIL CONSERVATION were G. P. Jenks, P. P. Richard, Dr. C. B. Yount, S. W. Wade, William E. Boyles, D. C. Killian, J. P. Huss, R. B. Gilbert, T. B. Parker, Calvin Mosteller, Hall Avery, Orville K. Hager, Ralph Foster, B. F. Baxter, and P. T. Nixon.

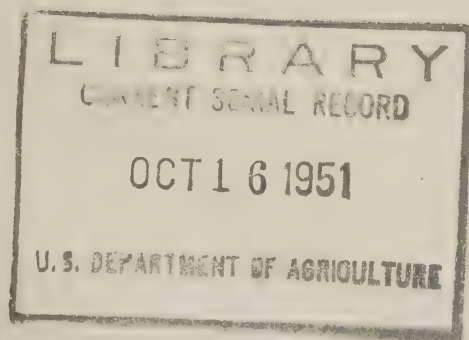
Each of these men had prepared a complete conservation plan with help from Stanley Pollock, Soil Conservation Service technician assigned to the Lower Catawba District in Lincoln County.

SOIL CONSERVATION

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